

MANUAL FOR CHILD NUTRITION IN RURAL INDIA



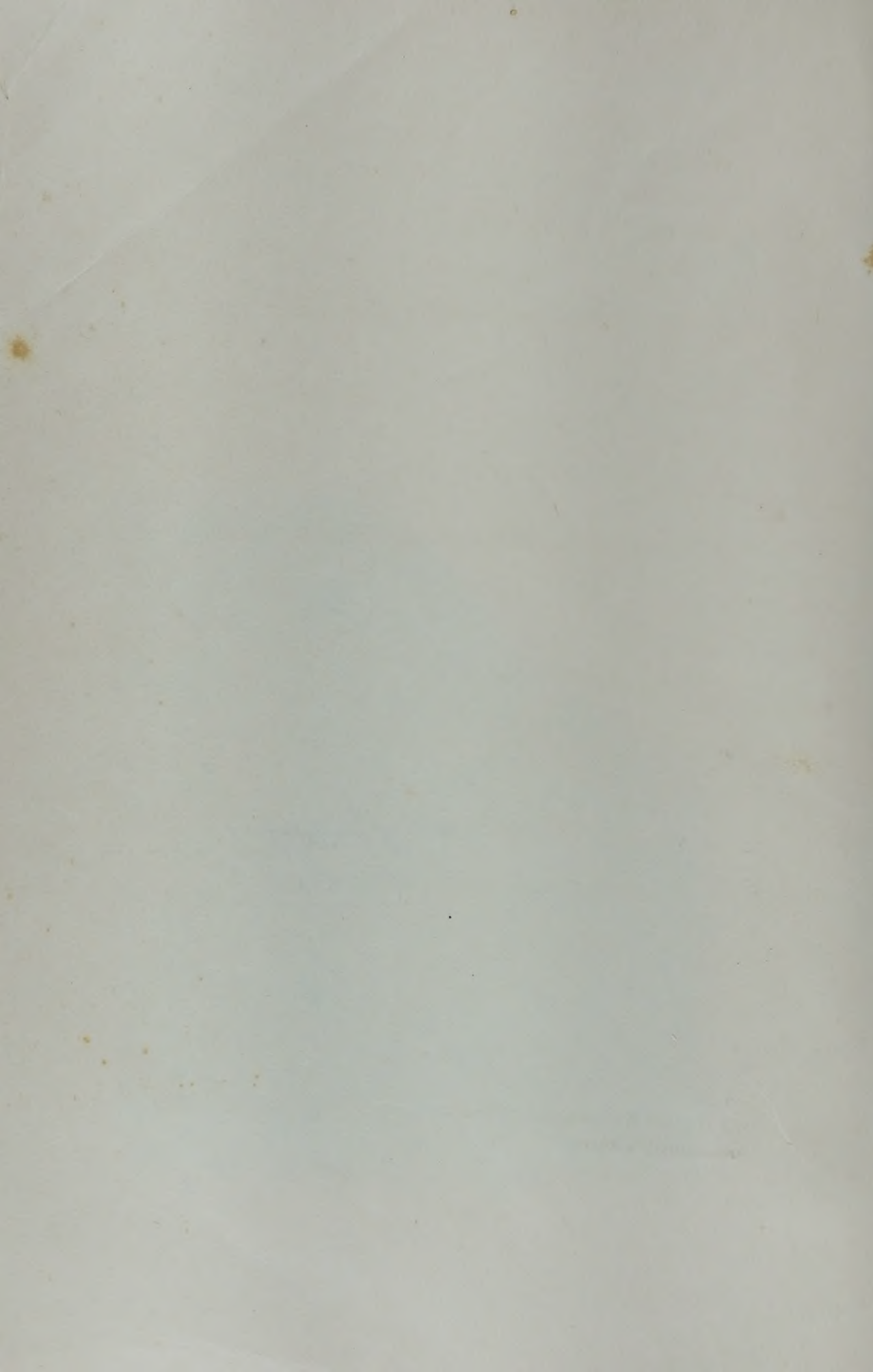
Editors

**CECILE DE SWEEMER, NANDITA SEN GUPTA K.,
SHEILA B. TAKULIA**

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IN RURAL INDIA**

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Cecile De Sweemer, Nandita SenGupta K., Sheila B. Takulia

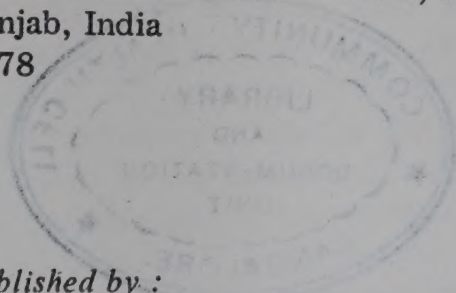
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by: M. King, F. King, D. Morley,
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FOREWORD

The future of any community or nation depends on the care given to children. The Government of India has placed high priority on improving the health and nutrition of children, and national programs are being constantly improved.

Good nutrition care requires more than just producing more food. Food is the most important part of the economy in a country like India. Farmers must grow the food, and then it must be processed and distributed. Government tries to see that fair practices and low prices give the poor a fair distribution. But even with a great deal of effort in getting the right amount and kind of food to the home it still does not mean that children will necessarily have good nutrition. Some nutrition programs have distributed large amounts of food in schools and feeding centres, but most of these activities have not helped the nutrition of children as much as had been hoped.

The greatest challenge is to help mothers to make better use of food that they already have to give good nutritional care to their children. This means that they should learn first what their children need so they can choose the right food. It means that villagers will learn to grow more of what they need for good health rather than just what they can sell. They will protect their food from being eaten by insects and other pests or from being spoiled by rain or bad weather. Mothers will learn how to cook and prepare foods at the right times and amounts and in the right way for their whole family. They will learn to use breast milk for as long as possible since this is one of the greatest natural resources of a country like India. After six months of age, they will begin to give weaning foods which have extra nutrients, such as iron, that the baby needs. As the child grows they will know to give a good balance between calories for energy and proteins for growing.

One of the good things about nutrition care is the way in which

it works with other programmes to produce better health. For instance, better nutrition increases resistance to infections. Decreasing infections also helps nutrition. It is well known that family planning is important in helping child nutrition because spacing between children means that there is more food and care for each one. Even though better nutrition increases the ability of mothers to have children, this does not mean that improving nutrition needs to increase population growth. Good nutrition care can provide an "entry point" to help educate parents that they should practice family planning. If people learn to trust health and nutrition workers because they have helped them when they are sick and they see that their children are healthy and do not die, then they will be more likely to believe them when they talk about the importance of family planning.

Doctors and administrators who have never worked in village homes sometimes think that nutrition education is simple and easy. But anyone who has tried to change the feeding habits of village people knows how hard it is to do. Village people have developed methods of child feeding over many years and parents are afraid their friends will criticize them if they change the old customs.

Home visiting is particularly hard work. A nutrition worker in the home is a guest rather than being in control as she would be in a clinic. It takes great skill to work with mothers so that they can see that they should change to new ways.

One of the most important challenges for a nutrition or health worker is to help people to solve their own problems. Health and nutrition workers sometimes make people too dependent on them, and this is not good. Their greatest success comes when parents in the community where they work learn to solve their own health and nutrition problems and support each other in providing care. This can be done best by training and using volunteer workers from the village. Then the whole community can take pride in their healthy and well nourished children.

This manual meets a great need in India. It has been adapted from a book that was written for Africa by Drs. Maurice and Felicity King, David Morley, and Leslie and Ann Burgess. These writers are some of the world's greatest authorities on child nutrition. The Indian manual is based on many years of practical experience at the Narangwal Rural Health Research Centre.

Many people at Narangwal helped in the work that led to this manual. The most important were the auxiliary nurse midwives and lady health visitors who actually did the village work that tested the methods and collected the research information. Other staff members who helped at various stages are too numerous to mention. To these and many other colleagues and collaborators through the years we express appreciation. We also thank the many government officials, educators and research workers in India who have sponsored and advised our work, as well as the great amount of other important nutrition research in India that provides the information on which this book is based. Most importantly, we would like to thank the wonderful people in the villages with whom we have had the privilege of living and working through many years. It is from the mothers that we have learned the most.

Few areas of work offer as much day to day challenge, mental stimulation, and emotional satisfaction as the chance to contribute to the health and development of children.

Carl E. Taylor
May 1978

ACKNOWLEDGEMENTS

To begin with, we would like to acknowledge the keen interest, continuous encouragement and valuable contribution of Dr. Carl E. Taylor, without whose continuing efforts we would not have been able to finish this work. We are deeply grateful to him.

In addition, this manual is the outcome of the efforts of a great many people who had spent numerous hours of field work, to provide valuable information. Our sincere thanks goes to all of them.

We are grateful to our colleagues, especially to Drs. A. Kielmann, I.S. Uberoi, G. Subbulakshmi and R.L. Parker for major contributions to the field work and writing. Our thanks are due to Sisters N. Masih, S. Vohra, D. Laliberte, and A. Forman who supervised field work and provided generous support to our work. To our social scientists, D.N. Kakar, R. Humar, H.S. Takulia we express our appreciation.

The Editors

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GROWTH

Weight For Age

1.1 Here is a picture of a child named Bantoo. He is a 1 year old and is a happy, healthy child. You see that he is being weighed, hanging from a weighing scale (Figure 1.1). If you look at the scale you will see that he weighs 9 kilograms. *Kilogram* is a long word to write, so we will write "kg" or "kilo." Bantoo weighs 9 kg. When a child like Bantoo starts life in his mother's womb he weighs almost nothing. In the 9 months inside the womb, he grows so fast that he weighs 3 kg when he is born. In the first 6 months of his life outside the womb, while he is feeding at his mother's breast, he grows very quickly. When he is 6 months old, he is about 2 times his birth-weight and weighs $6\frac{1}{2}$ kg. We say he has *doubled* his birth-weight.

*A CHILD DOUBLES HIS BIRTH-WEIGHT
IN THE FIRST 6 MONTHS OF HIS LIFE*

From then on he grows more slowly, so that by the end of his first year, when he weighs 9 kg, he weighs about 3 times as much as he did when he was born. We say he has *tripled* (multiplied 3 times) his birth-weight.

*A CHILD TRIPLES HIS BIRTH-WEIGHT
IN HIS FIRST YEAR*

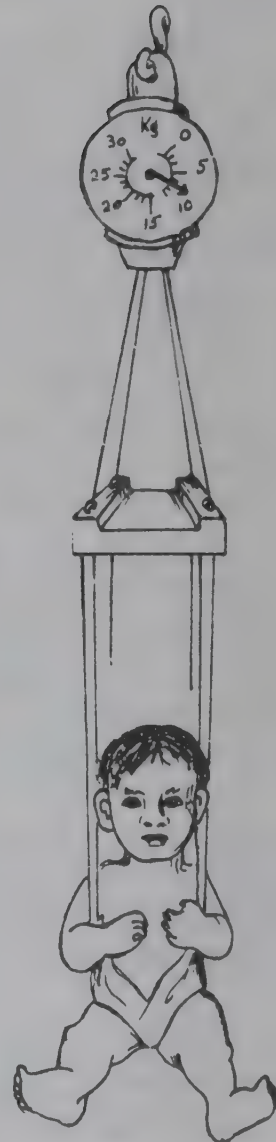


Figure 1.1
Weighing Bantoo

When Bantoo is 2 years old, he should weigh about $11\frac{1}{2}$ kg. Because Bantoo is a healthy, well-fed child and gets heavier and taller every month, we say he is growing.

In Figure 1.2 below you see Bantoo and 3 other healthy children. Hari Singh was born this morning and weighs $3\frac{1}{4}$ kg, slightly more than Bantoo did when he was born; Ranjeet Singh is 6 months old and weighs $6\frac{1}{2}$ kg, as Bantoo did when he was that age. Ishmael is 2 years old and weighs $11\frac{1}{2}$ kg. When Bantoo is 2, he should weigh about $11\frac{1}{2}$ kg.

Healthy children of the same age weigh about the same. In the example about Bantoo and his friends you have seen that there can be small differences in weight between them. It is very important to remember that healthy children of the same age do not have to be the same weight, exactly. For example, some healthy 1-year-old children are about 10 kg, some about 9 kg and some about 8 kg. So when we say that a healthy 1-year-old should weigh 9 kg, we mean that this is the average, ordinary, or normal weight of healthy 1-year-old children. A healthy child is at all times near the weight that he should be for his age. For every age there is a range within which a child's weight can be considered normal. At 1 year of age this range is, thus, between 8.0 and 10.0 kg.



Hari Singh - at birth



*Ranjit Singh
6 months*



*Bantoo
1 year*



*Ishmael
2 years*

A HEALTHY 1-YEAR-OLD CHILD
WEIGHS ABOUT 9 KILOGRAMS

Figure 1.2
The Older a Child Is
The More He Should Weigh

In Table 1.1 below we can see the average weights of healthy children of all ages.

Table 1.1
WEIGHT FOR AGE

Child's Age		Example of a healthy child's weight gain			
Months	Years	Fractions		Decimals	
Birth		3	kg	3.0	kg
4		5½	kg	5.5	kg
6		6½	kg	6.5	kg
8		7½	kg	7.5	kg
10		8½	kg	8.5	kg
12	1	9	kg	9.0	kg
18	1½	10½	kg	10.5	kg
24	2	11½	kg	11.5	kg
36	3	13¾	kg	13.75	kg
48	4	15½	kg	15.5	kg
60	5	17½	kg	17.5	kg

The numbers in the middle let us know that a child on the average weighs 3 kg at birth. At 4 months he weighs five and one-half kilograms (5½ kg) and at 60 months (5 years) he weighs 17½ kg. Half (½) and three-fourths (¾) are named *fractions*, so this is a list of children's weights in fractions of a kilogram. Because fractions are difficult to use, the numbers on the right say the same thing but in an easier way using *decimals*.

A child must be given enough of the right food if he is going to grow properly and reach the right weight for his age. A child who does not get enough of the right food is *much lighter* than he should be for his age. We say that he is malnourished, or that he is suffering from *malnutrition*. Let us, for example, weigh Mohan Singh (Figure 1.3 on the next page). He is a 1 year old and we find he weighs 5 kg. But a healthy 1 year old child weighs about 9 kg. Mohan Singh

weighs only about half as much as he should for his age, and is very malnourished. Let us take another child, Gurcharan Kaur. Gurcharan is 18 months old and weighs $8\frac{1}{2}$ kg. But a healthy child of 18 months should weigh about $10\frac{1}{2}$ kg, so Gurcharan weighs about $\frac{4}{5}$ as much as she should. She is malnourished, but not as badly malnourished as Mohan Singh. The children are underweight for their ages; Mohan Singh is very underweight, and Gurcharan is less underweight.

Later you will read about how much of every kind of food a child must have every day if he is going to grow to the right weight for his age. You will read about why malnutrition is so important, and how we can *prevent it*.

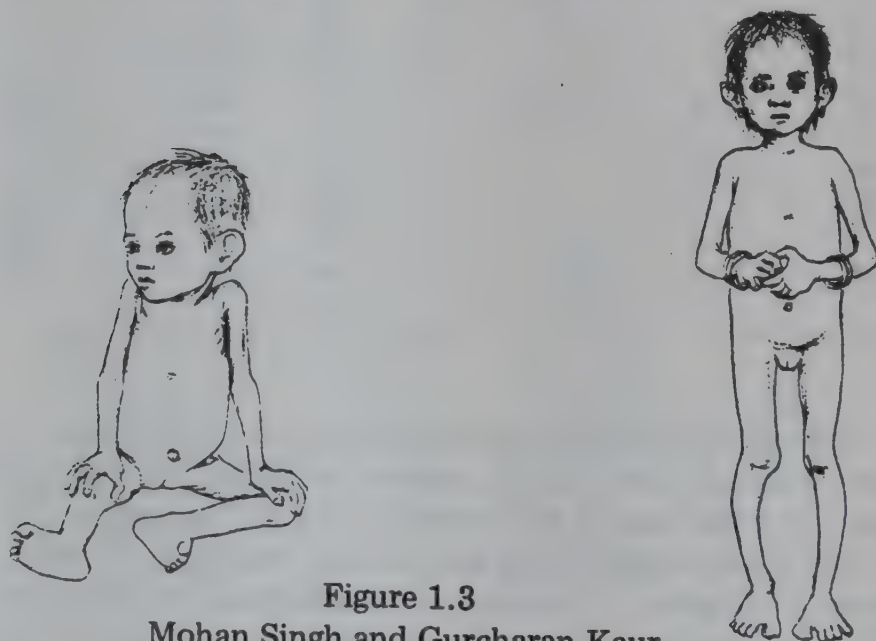


Figure 1.3
Mohan Singh and Gurcharan Kaur

The Weight-For-Age Graph

1.2 Most of the rest of this chapter is about a special kind of picture named *a graph*. By using a weight-for-age graph we are able to see if a child is the right weight for his age, and if he is growing properly. The weights that you have read in Table 1.1 are not easy to remember, and it is sometimes difficult to find out how many months old a child is. The right kind of graph makes these things much easier.

Thinking about how a graph is made helps us to understand the graph. Let us look at Figure 1.4 (below) to see how this graph is made. To help you understand, we shall go by steps. Take out a ruler, pencil and paper and follow the steps: *Step 1.* Let us start by drawing a line. *Step 2.* Divide the line into 5 equal parts, one for every year of a child's age till he is 5. This is the age line. Now you can see where the ages of our healthy children come on this line. *Step 3.* Hari Singh was born this day, so his age is 0. Ranjeet Singh is 6 months old. Bantoo is 1 year old, and Ishmael is 2. To see some healthy children who are older, let us take Jaswant Singh who is 3 and weighs $13\frac{3}{4}$ kg, Ram Lal who is 4 and weighs $15\frac{1}{2}$ kg, and Prem Singh who is 5 and weighs $17\frac{1}{2}$ kg. *Step 4.* Now let us draw weight lines for the weights of the children up from the age line. We give all kilograms the same length and draw a line going up for every child's weight. A heavy 5-year-old child like Prem Singh has a long line, and a small child like the newly-born Hari Singh has a short line. When you look at the picture of *Step 4* you see that the short lines for a younger and lighter child are on the left and the long lines for an older and heavier child are on the right.

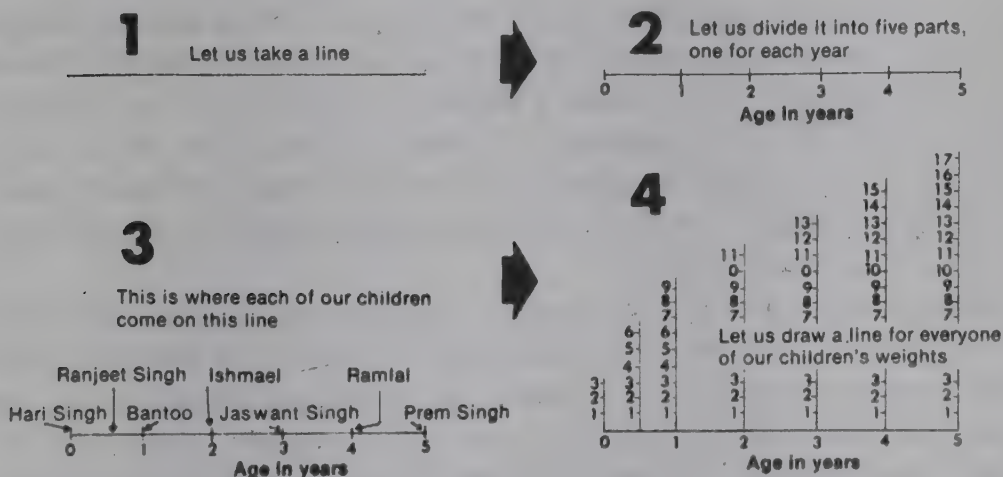
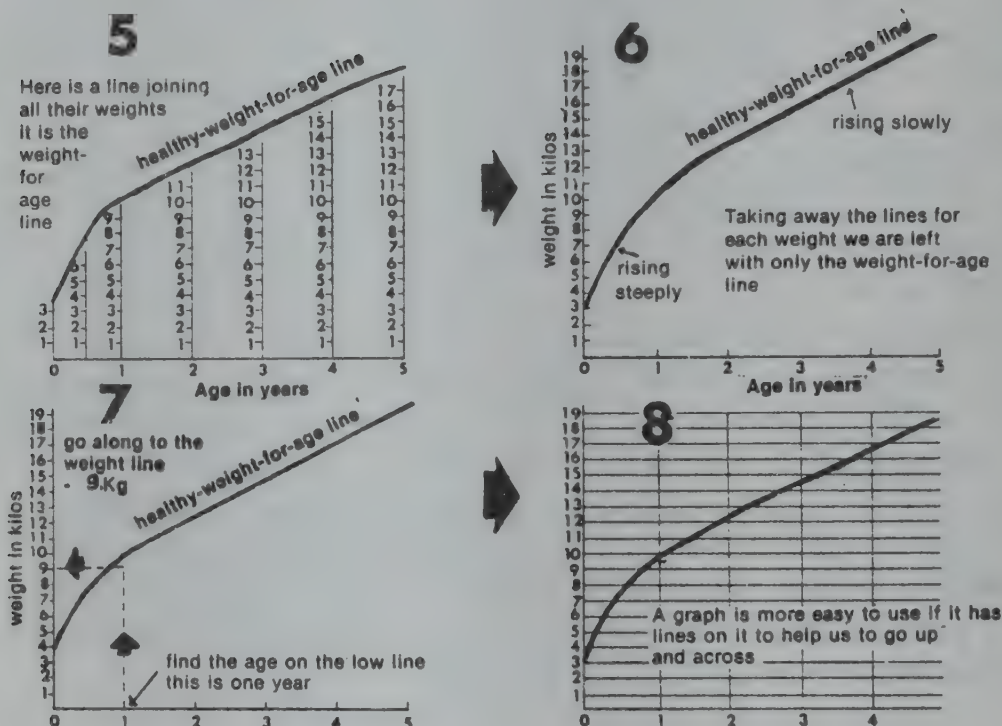


Figure 1.4
Understanding the Weight-for-age Graph

Figure 1.4 - continued



Step 5. Join the tops of these weight lines to give a smooth curved line, or a "curve." (A curved line is one that is not straight.) This is the weight-for-age line for healthy children. We say it is the Healthy-weight-for-age line. (Sometimes it is simply named the "top line.") We do not have to draw a separate line for the weights of every child; we can simply mark the top of all the lines and join the tops to give us the final picture **Step 6**.

With a graph like this it is easy to find out what weight a healthy child *should be*. All we have to do now is to look for his age on the age line at the bottom of the graph. We then look *straight up* a line to the healthy-weight-for-age line and then *straight across* to the weight line. Picture 7 shows how we find the weight of a healthy 1-year-old child. Because it is not easy to go straight up and straight across, graphs are drawn with lines on them to make this easier (8)

A graph like this is very useful, because we can easily find what the weight of a healthy child should be at any age between birth and 5 years.

You can see that from the time of birth till the age of 1 year the healthy-weight-for-age line climbs up the graph very quickly or steeply, and that after 1 year the line climbs more slowly and is flatter. This is because a child grows very fast in the first months of his life and more slowly after that. We can put this in another way: the younger the child is, the faster he grows.

The Weight-For-Age Graph in Months

1.3 We have written our graph in years from birth to 5 years. A year is a long time and a child adds on weight every month, so it is good to work with his age in months. The graph in Figure 1.5 (see next page) is written with a child's age in months. It goes from 0 (birth) to 60 months or 5 years (5 years = 60 months). The graph stops at 60 months so we cannot use it for children older than this.

By using a graph like this we can easily see if a child is the right weight for his age, or if he is *underweight*. We weigh him, and put a dot on the graph opposite the place for his age in months and his weight. The graph (Figure 1.5) shows our healthy, well-nourished children, Ranjeet Singh, Ishmael, Hari Singh and Bantoo. They are all near the healthy-weight-for-age line.

Let us see where the malnourished children come on the graph. Mohan Singh, who weighed 5 kg when he was 1 year old, comes far under the healthy-weight-for-age line and is very underweight. Gurcharan Kaur, who weighed 8½ kg at the age of 18 months, is under the healthy-weight-for-age line, but not as far under it as Mohan. It is easy to see that Gurcharan is a bit malnourished but that she is not as malnourished as Mohan Singh.

Use the Weight-For-Age Graph to Measure Growth

1.4 Weight-for-age graphs are used in another way. We use them to see if a child is growing as he should. Let us weigh Bantoo every 2 months and every time put a dot (•) - for his weight on the graph. Let us join the dots to make a line (—•—). We see from Figure 1.6 (see page 9) that Bantoo's line of dots goes up the graph and that it is near to the healthy-weight-for-age line. His line of dots is not exactly

Figure 1.5
A Weight-for-Age Graph

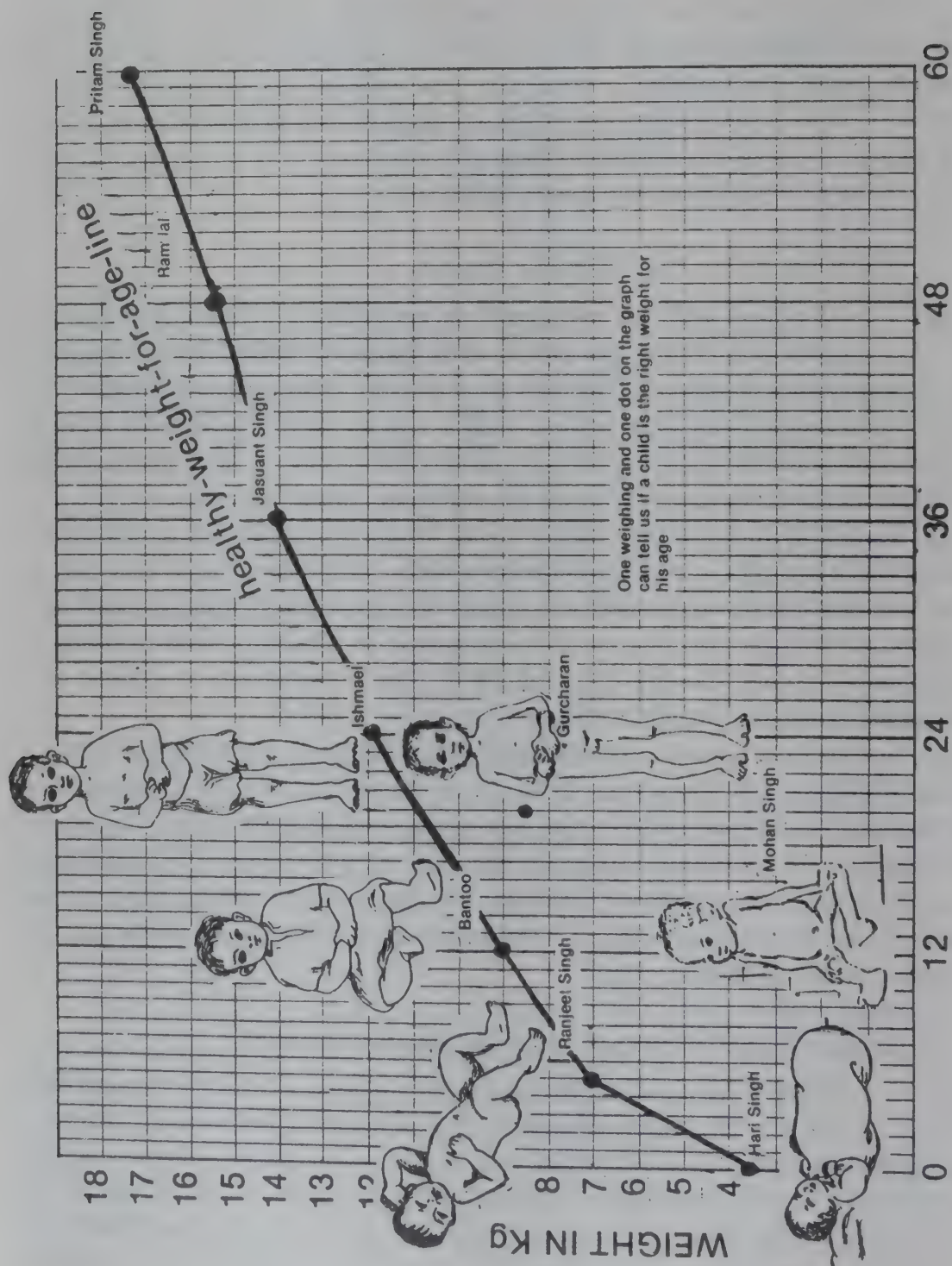
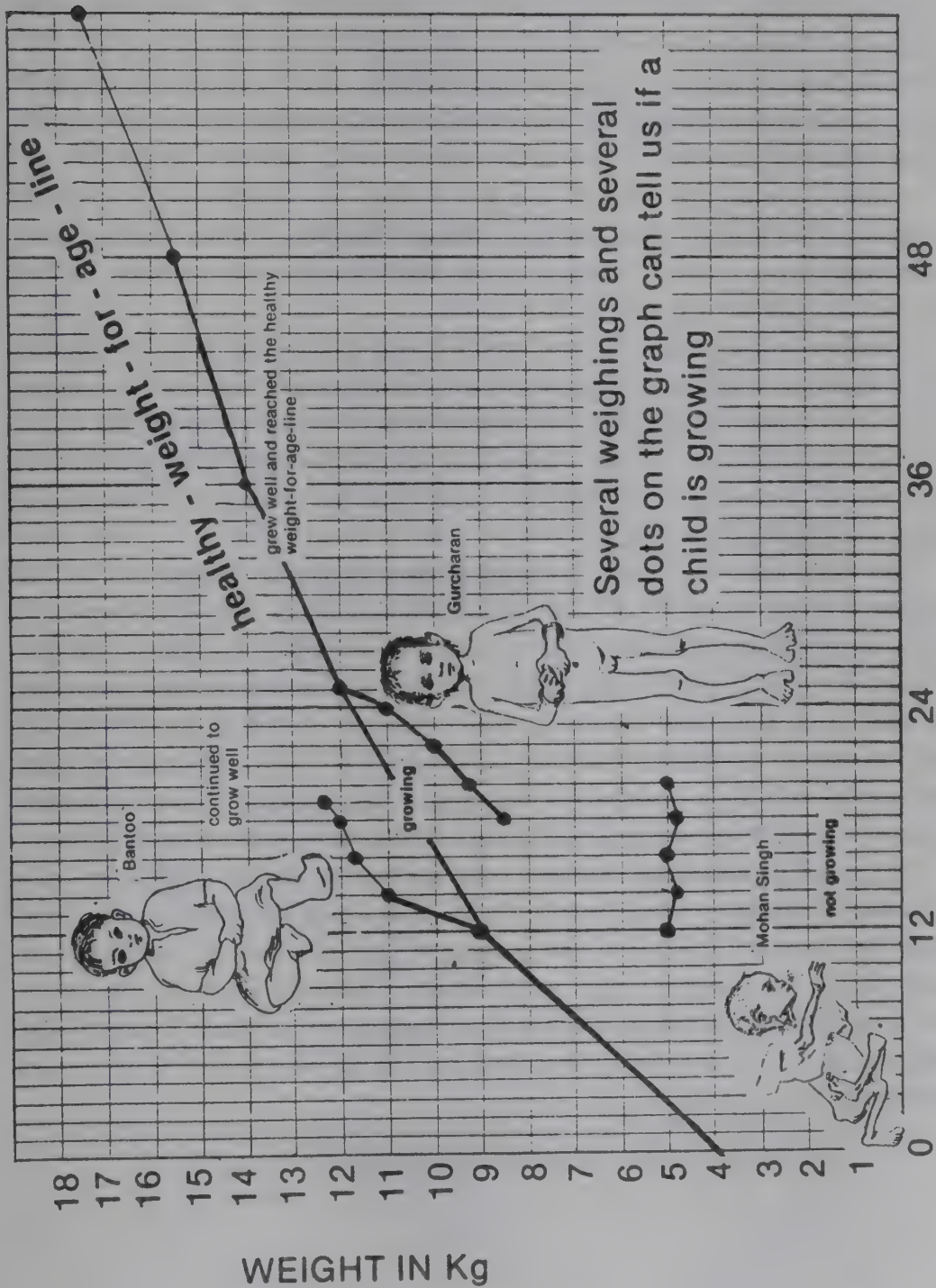


Figure 1.6
Use of Weight-for-Age Graph to Measure Growth



on the healthy-weight-for-age line, but this does not matter. The weights of healthy children are near to the line, but not exactly on it all the time; in the same way, the lines of dots that mark their growth are most times near to the line but not exactly on it every time. We see that Bantoo is the right weight for his age and that he is growing well.

When Mohan Singh first came to the clinic, he was very malnourished. His mother did not let him come into the hospital, but she did take him to the clinic to be weighed. The nurse's teaching of how to give food to the child was not clear to Mohan's mother and the mother was not able to do what the nurse said. Mohan Singh did not get enough to eat and though he got older, his weight stayed nearly the same. The line of dots for his weight did not climb up the graph. He did not grow, and he became more and more malnourished. After a few months he died from malnutrition.

Gurcharan's mother learned more from the nurse than did Mohan Singh's mother. She grew much food in her garden and fed her as the nurse in the clinic taught her. Every time she took her daughter to the clinic, Gurcharan was heavier than the month before. She grew well. The line of dots for her weight climb up the card and touch the healthy-weight-for-age line.

So you can see that a weight-for-age graph helps us to see whether a child is well or badly nourished and to see whether he is gaining weight and growing. If you are teaching a mother, and you see that her child is growing, you know that she feeds him the right way and that you are teaching well. So, by using a weight-for-age graph to see if a child is growing, we can see if our teaching is right. Most useful of all, a weight-for-age graph lets us see a child's weight and growth easily and quickly, without doing any work with numbers.

As a child gets older, he not only grows in weight, he grows taller or grows in height. His head, chest and arms get large. All these things and many others can be measured, but growth in weight is the easiest thing to measure in a busy clinic. Children who are ill do not grow well and by measuring growth in weight we measure health. This is why so much of this book is about growth in weight and how we can measure it.

BY MEASURING GROWTH WE MEASURE HEALTH

Two important things about a healthy child are that he is growing and that he is the right weight for his age. But these are not the only important things. A child should walk and talk as other children of the same age. He should run and jump and have interest in people and things around him. He should have *good color, shiny skin and strong black hair*. He should not have any *cough or diarrhoea*, or any other thing that lets us know that his health is not good. One good way a mother can keep her child healthy is to take him to a child-clinic sometimes also called “*Well-Baby Clinic*” or “*Under-Fives Clinic*” every month.

The Well-Baby Clinic and the Road-to-Health Card

The Well-Baby Clinic

1.5 A Well-Baby Clinic is a special kind of clinic for children from the time they are born till they are 3 to 5 years old. A child who is taken to this clinic is given special medicines named *vaccines*. These vaccines stop him from getting measles, smallpox, tuberculosis (TB), diphtheria, whooping cough (pertussis) and tetanus. The vaccine which prevents diphtheria, pertussis and tetanus is named DPT, or triple vaccine. We say that a child who has been given these vaccines in the right way is *immunized* against these diseases. (See Figure 1.7 below). We must give DPT and polio vaccine 3 times if they are to

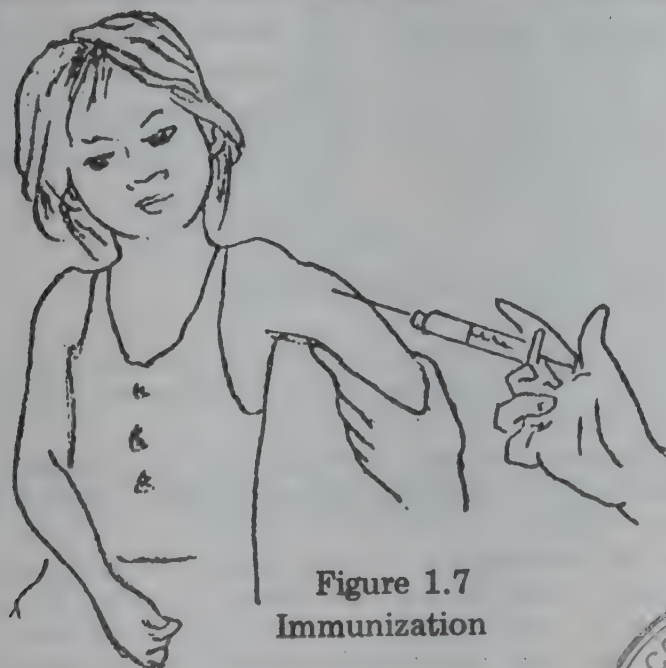
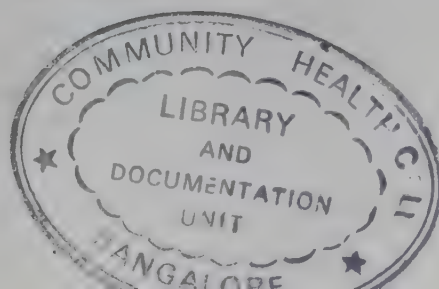


Figure 1.7
Immunization



protect the child, but we can give the other vaccines only once. At a Well-Baby Clinic, a mother is taught how to feed and look after her children, and if a child is ill he can frequently be made healthy without having to go to a hospital.

The Road-to-Health Card

1.6 It is important for these clinics to attempt to make certain that children are properly nourished and are growing at a good rate all the time. Many of the child clinics now give every child his own weight-for-age graph printed on a strong card. His mother keeps it for him in a strong plastic bag. The mother in Figure 1.8 (see next page) is bringing her 2 children and their cards to the Well-Baby Clinic. If you have not seen one of these road-to-health cards, on page 14 is a picture of one (Figure 1.9).

The card for the Well-Baby Clinic has an inside and an outside, and the weight-for-age graph is divided into 5 parts. On the inside of the card, the part for the first year of the child's life is on the left, the part for his second year is in the middle, and the part for his third year is on the right. The graph for a child's fourth and fifth years is printed on the outside of the card.

The other part of the card has space for the name of the child his birthday and other things. The weight in kilos is written up the left hand side of all parts of the graph. The cards used in different countries are not exactly the same. The cards pictured in this book are those currently used in some clinics in India. If these cards are not as yet available in your clinic, ask your supervisor or doctor to order them from the agency listed below*. The cards from this agencies are adapted for using all over India.

Agencies from which to get "Road to Health Cards"

WEIGHT CARDS

In fifteen languages—can be obtained from the Voluntary Health Association of India, C-14 Community Center Safdarjung Development Area, New Delhi-110 016.

"Any Language cards" can be obtained from the Community Health Department, C. S. I. Hospital, Jammalamadugu, Cuddapah District, Andhra Pradesh.

Weight Card Flannelgraph with captions and pictures about growth, foods, immunization, family planning, and diseases is available (price Rs. 20) from the Audio-Visual Department, C.M.C. Hospital Vellore 1, N. Arcot District, Tamil Nadu. (Also available from the Voluntary Health Association of India).



Figure 1.8

A Mother and Her Children
Going to a Well-Baby Clinic

WELL-BABY CLINIC

CLINIC	CHILD'S No
CHILD'S NAME PRITAM Boy/Girl	
MOTHER'S NAME	REGISTRATION No
FATHER'S NAME	REGISTRATION No
DATE FIRST SEEN	BIRTHDAY

BROTHERS AND SISTERS		
Year of birth	Boy/Girl	Remarks

ANTI-TUBERCULOSIS IMMUNISATION (BCG)
Date of BCG immunisation _____
BCG can be given immediately after birth

SMALLPOX IMMUNISATION
Date of Immunization (or soon after 3 months as possible) _____
Date of scar infection _____
Date of re-immunisation (between 1 year and five years of age) _____

POLIO MYELITIS IMMUNISATION
Date of first immunisation _____
Date of second immunisation _____
Date of third immunisation _____

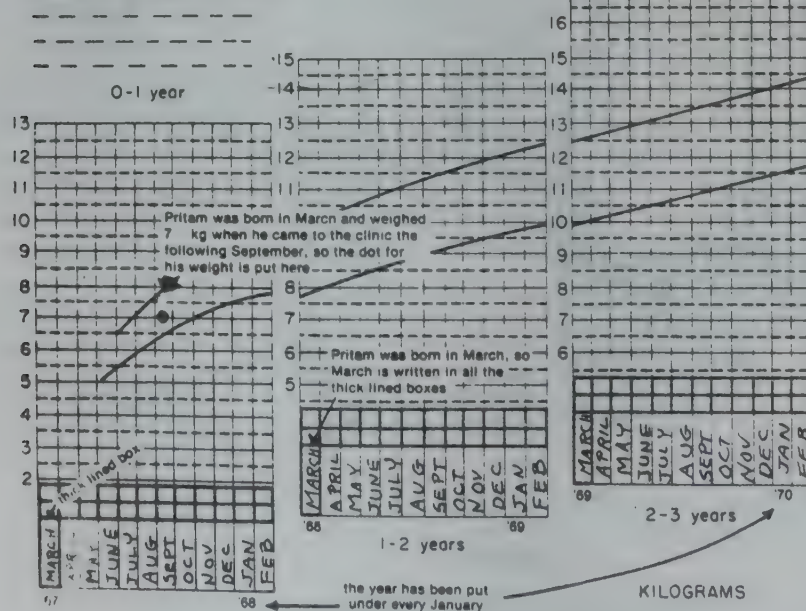
WHOOPIING COUGH, TETNUS & DIPHTHERIA IMMUNISATION
Date of first injection _____ (or the age of one month or later)
Date of second injection _____ (one month after the first injection)
Date of third injection _____ (one month after the second injection)

MEASLES IMMUNISATION
Date of immunisation _____ (on the age of 9 months)

3-4 years - 4-5 years

OUTSIDE

Reasons for special care,



INSIDE

The "Road to health chart" and weight for age graph

Figure 1.9

TEACH MOTHERS WHAT A WELL-BABY CLINIC
TRIES TO DO

It is easy to weigh a child. It is sometimes not as easy to find out how many months old a child is because not many mothers know this exactly. Even if you know his birthday, it is not easy to know exactly how many months old a child is. If you want to see how difficult this is, ask some people how many months old a child will be in July next year, if he was born in February last year. Many people will give a wrong answer and they will take a minute or so to *work it out*. An easier way to find out a child's age is to write the months of his life at the bottom of a weight-for-age graph in a special way. This is how it is done.

On the inside of the card you will see 3 rows of 12 boxes or spaces on the bottom of every card (Figure 1.9, page 14). A year has 12 months, and the 3 rows of 12 boxes are for the first 3 years of a child's life. Every box is for a different month. The left-hand box in every row has a very *thick* line around it. This *thick-lined* left-hand box is for the month in which the child was born. Pritam Singh, for example, was born in March, so March is written in every thick-lined box on the card in Figure 1.9. Let us take another example. Calvin was born in August, so August must be written in every thick-lined box.

The other boxes on the card are for the other months of the year. For Pritam Singh, who was born in March, the other months are April, May, June, July, August, September, October, November, December, January and February. For Calvin, who was born in August, the next months are September, October, November, December, January, February, March, April, May, June and July. The 12 months of the year must be put in like this every time. All the rows of boxes must start with the month in which a child is born in the special thick-lined box on the left.

In addition, we have to put in the years on the card. Under the first of the thick-lined boxes (on the left side of the card) we put the year the child was born, and under the other thick-lined boxes we put the years after that. If a child was born in April 1969, we put '69 under the first thick-lined box and '70, '71, '72 and '73 under the other boxes. When we come to January, we put the number of the new year under it. In Figure 1.9, '68, '69 and '70 have been put under 3 of the Januarys on Pritam's card.

**PUT THE CHILD'S BIRTH MONTH
IN EVERY THICK-LINED BOX**

Sometimes a mother knows her child's birth date in the Western calendar. But what can you do if she does not know the *month* or the year of his birth in the Western calendar?

If she knows the date in any of the local calendars, you can easily find the right date by using a double calendar which has Western and local dates. Because India has many different calendars, you should make your own double calendar, putting down the local sankrants and festivals and the dates in the Western calendar. Put in all important festivals. Be certain to keep the double calendar up to date because every year the sankrants of every month are different compared to the Western calendar.

To find out a child's birth date, ask his mother to remember the month the child was born and how near to a sankrant or festival it was. If a mother does not know the exact birth date in the local calendar, you can attempt to find the date in a different way. A mother may be able to remember if her child was born before or after the child of one of her friends, and she may be able to say about how long before or after. If you can find the date of birth of this friend's child, you can make a guess about the date of birth of the mother's child. If you guess nearly right about the month the child was born, it will usually be good enough.

It is very easy to find a child's age when he has been weighed and given a weight card at birth. If you are a midwife, put a weight card in your delivery kit. Ask your dais to help you so that you can take the weight of every child soon after birth.

GIVE EVERY CHILD A ROAD-TO-HEALTH CARD AT BIRTH

Using the Road-to-Health Cards At a Well-Baby Clinic

- 1.7 Weigh every child who comes to a clinic. If he has no weight card, give him a card. Put a dot for his weight above the box of the month in which the clinic takes place. We saw that Pritam Singh was born in March, and that March was written in all the thick-lined boxes on his card. Let us say that his mother brings him to a

clinic in September, and that he weighs 7 kg. The dot goes across from the line for 7 kg and above the box for September on the first part of the card, as is shown in Figure 1.9. When a clinic takes place in September, a nurse puts every child's weight above the September boxes on his card. Different children will have their September boxes in different places because of their different birthdays. For a child in his first year (who is less than 2 years old) she will put a dot above the September box on the first part of the card. For a child in his second year (who is less than 2 years old) she will put a dot above the September box in the middle part of the card, and so on. This way of writing months on the card makes it easy to get a child's age right. A clinic can take place at any time in the month, and you can put a big dot for weight in the middle of the box for that month.

If a child weighs an exact number of kilograms, the nurse puts a dot on the line for whole kilograms. A child may not weigh an exact number of whole kilograms. He may, for example, weigh $6\frac{1}{2}$ or $8\frac{3}{4}$ kgs. If there is exactly half a kilo in a child's weight, the dot goes on the *broken half-kilo line*. If a child's weight is a bit over a whole kilo, the dot goes a bit above a whole kilo line. If a child's weight is a bit under a whole kilo, the dot goes a bit below a whole kilo line. The best way to do this is to place the dot to the nearest $\frac{1}{4}$ kilo. This has been done in Figure 1.10 below where there are dots for 10 kg, 10.25 kg, 10.5 kg and 11 kg.

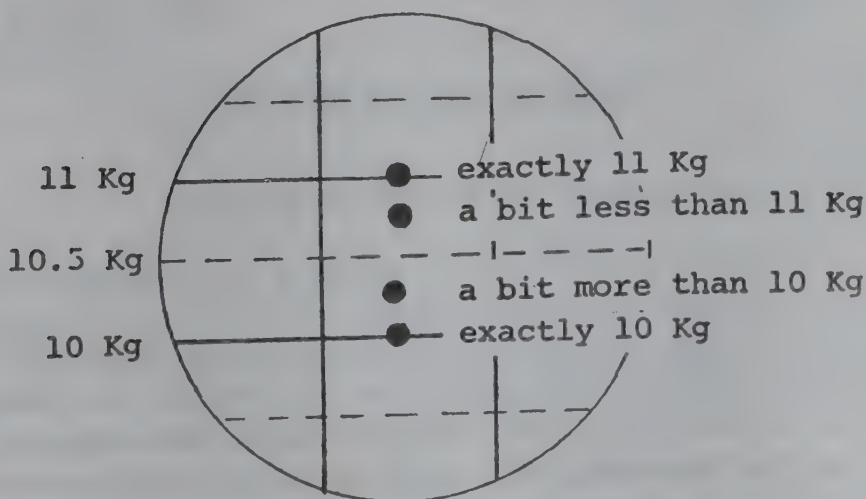
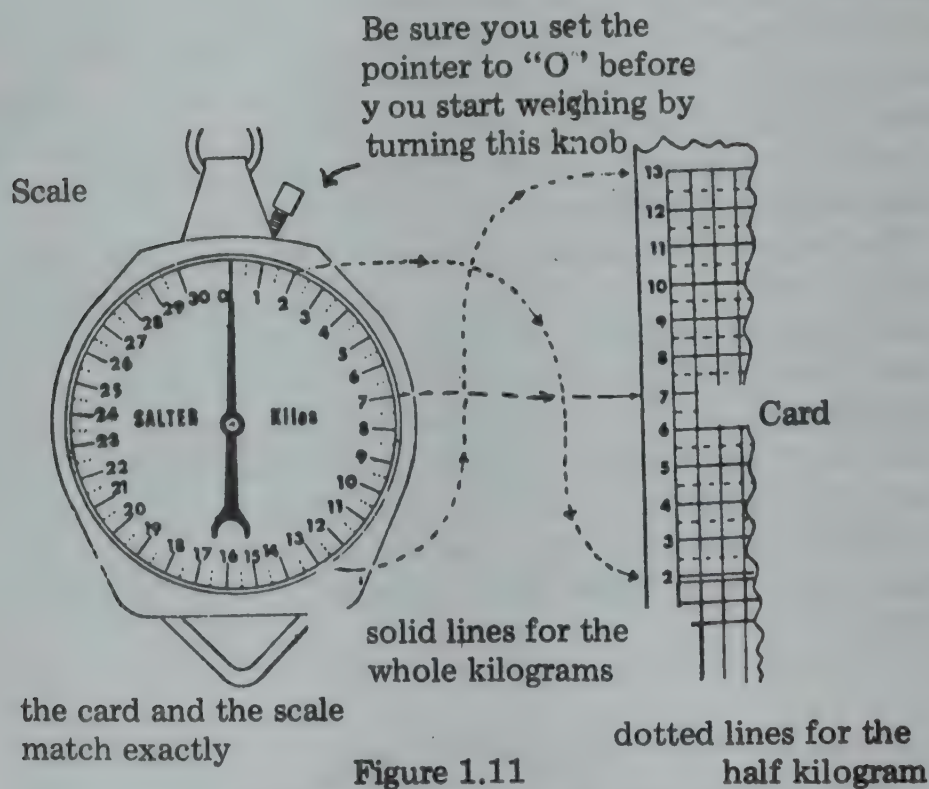


Figure 1.10
Putting the Dot in the Right Place

Because clinic workers sometimes find the numbers on a scale difficult to understand, a commonly used scale is shown in Figure 1.11 below. You will see that the weights and the lines are drawn in the same way on the scale and on the weight-for-age graph.



A Scale for the Well-Baby Clinic

The Growth Curve on the Road-to-Health Card

1.8 A growing healthy child weighs a bit more every time his mother brings him to a clinic, so the dots on his card climb higher every month. These dots can be joined with a line which climbs up across the card as a child grows older and heavier. If a healthy child comes to a clinic every month for 3 to 5 years, the line made by his dots goes up *across* the graph on the inside of the card and *across* the graph on the outside. The line of dots that a child's weight makes on the card is named his *growth curve*.

So far, we have talked about only one line of the graph. This is the *average* line of healthy well-fed children in most parts of the world. It is named the *healthy-weight-for-age line*. It is made by finding the average weight-for-age of many healthy children with parents who could feed them well. The dot for the weight of a healthy child is usually near to this line. The more malnourished he is the farther below the line the dot for his weight is. If the dot for his weight is only a bit below the healthy-weight-for-age line, we do not have to worry. If it is far below, we know the child is malnourished, and we must attempt to make certain that his mother feeds him properly. A second line on the graph lets us know when to start worrying about a child's weight. We name this second line the *lower line*. The healthy-weight-for-age line can be named the *top line*.

Things the Road-to-Health Card Lets Us Know About the Child

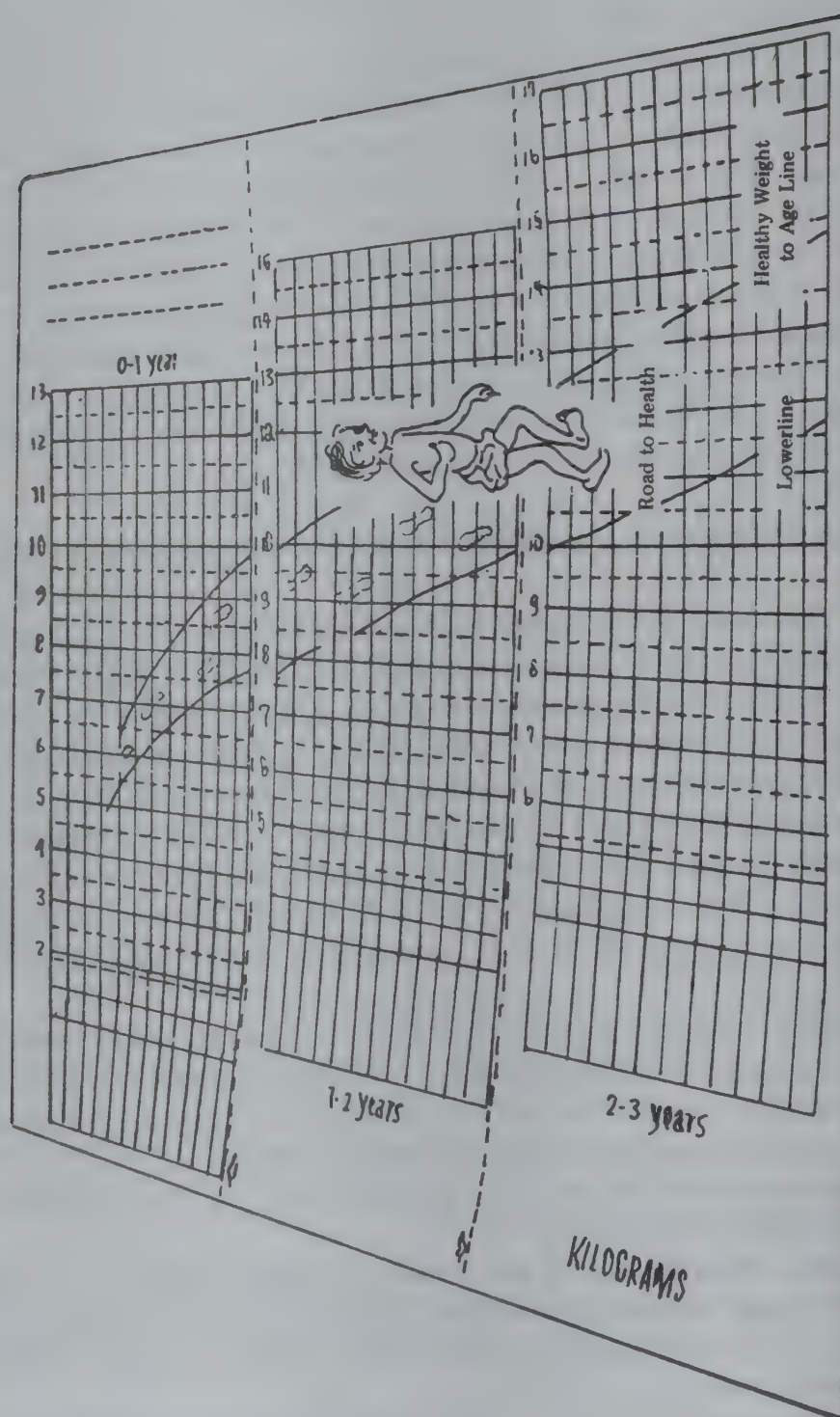
1.9 The space between the 2 lines is named the "road to health," and for this reason the card for the Well-Baby Clinic is frequently named the *road-to-health card*. A mother likes to think of her children walking on a road which goes to health. The road on the card is like a road between the fields and the dots on the graph are like a child's footsteps (Figure 1.12, see next page). If a child walks off the road-to-health toward the bottom of the card, he becomes thin and malnourished. The "Well-Baby" or Under-Fives Clinic attempts to make certain that every child is on the road to health and is above the lower line.

If a child is heavier than he should be for his age and is above the top line, this is usually not important. There are some children who are overnourished and fat but we do not need to worry about them in this book, since there are not many of them in India.

If there is no child below the lower line, there is no child who is much underweight for his age.

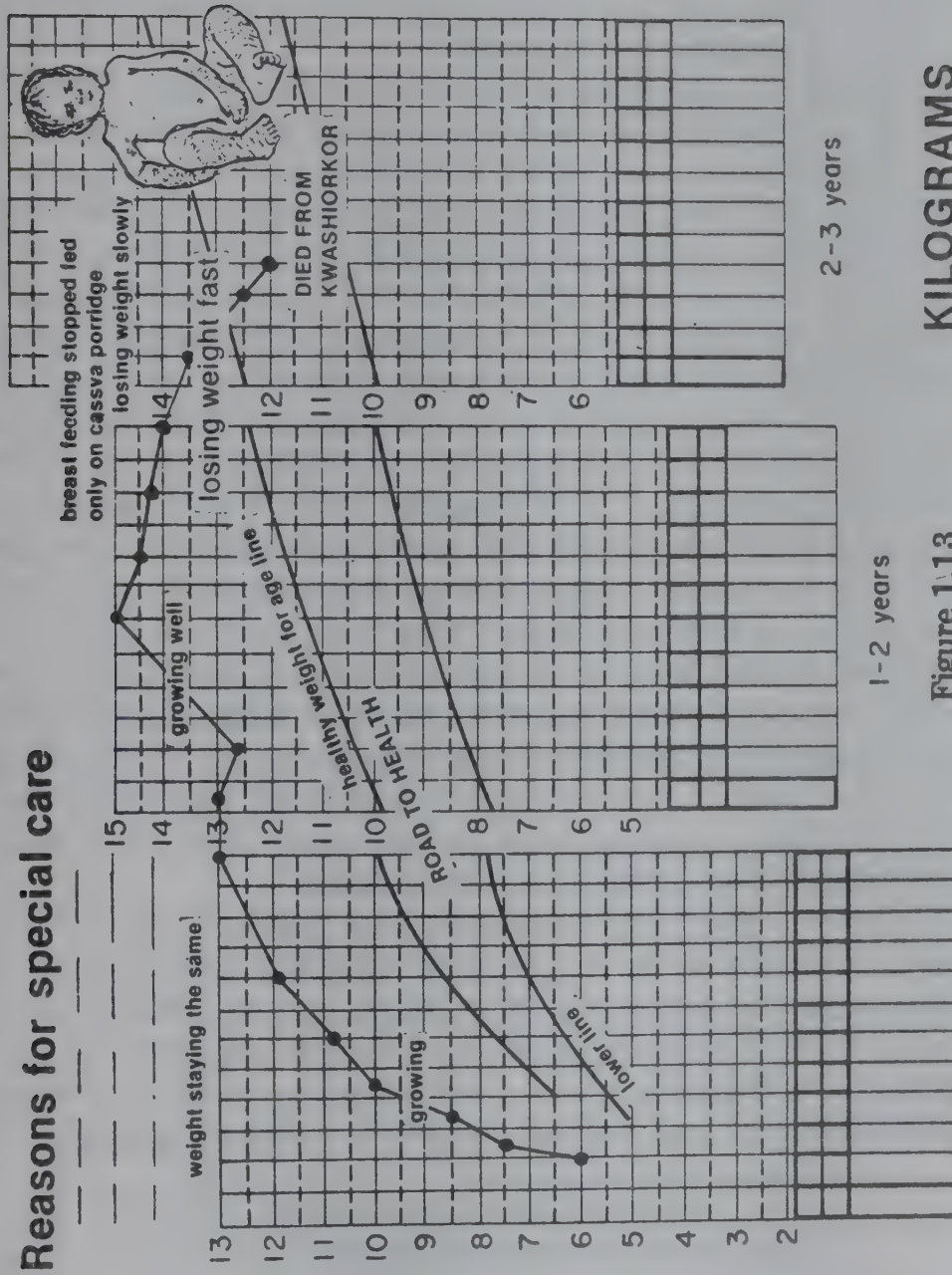
The only children above the lower line who may be in danger would be the small number of children like Satnam Kaur in Figure 1.13 (see page 21). To understand this we will first talk about the different ways the weight card can be useful.

A road-to-health graph is useful in 2 ways. As we have seen, even 1 weighing and 1 dot on the graph lets us know if a child is the right weight for his age or if he is underweight. If a child has been



CHILD ON ROAD-TO-HEALTH

Figure 1.12



KILOGRAMS

Figure 1.13

The Story of Satnam Kaur

weighed every month and there are a number of dots on his graph, we can know if he is *growing* or not. A child is growing if his line of dots is climbing up the card. A child is not growing if his line of dots is not moving up. If a child is below the road-to-health but is growing well, he will probably climb onto it again in a short time and become the right weight for his age. Even though his weight is below the lower line, if he is growing well and his growth curve (his line of dots) is climbing up the card, he is doing well.

Sometimes a child is on the road to health or even above the top line because he has been fed well in the early months of his life. But even though he is above the top line, his growth curve may become flat or start to fall. This is important because it says that now he has stopped growing and that he is malnourished. It may be several months though before his line of dots falls below the lower line because he starts so far above the lower line. Sometimes a child like this can even die from malnutrition before his weight falls below the lower line. Satnam Kaur did this. She grew so well till she was 18 months old that the line of dots on her road-to-health card was well above the top line (Figure 1.13, page 21). At 18 months Satnam was drinking her mother's milk and buffalo milk and was eating suji, dahlia and some chappati with vegetables. Then Satnam Kaur's mother died and an old aunt and uncle took care of her. They were poor, and they fed her with tea with a small amount of milk and much sugar. She was very sad and did not even take her chappatis. She lost weight, stopped growing, and became so malnourished that she got kwashiorkor when she was a bit more than 2 years old (see Section 2.8). She was so fat to start with that this happened while she was still on the road to health. Satnam died 3 days after she went to the hospital.

We cannot find the malnutrition of children like Satnam by weighing them just once. We have to weigh them for at least 3 months before we can see that they are not growing. Whether a child is growing or not is more important than what his weight is. A line of dots from many weighings is more useful than 1 dot from 1 weighing because it is the only way that we can know if a child is growing or not.

**GROWTH IS MORE IMPORTANT
THAN POSITION ON THE WEIGHT CARD**

Using the Road-to-Health Card for a Nutrition Survey

1.10 You can use a road-to-health card in one other way. You can put the weights of many children on one card. If you use a road-to-health card in this way, you are measuring the nutrition of *a community*. Measuring the nutrition of a community like this is one way of doing a community nutrition survey. A *survey* is only another name for a way of looking carefully at a group of people or things. In the “things to do” part at the end of this chapter, you will learn how to do your own community nutrition survey.

You can see in Figure 1.14 (see next page) how such a community survey has been done. Card A is from an area of a city where government workers live. These people are well paid and have much money to buy food for their families. A dot has been put on the card for the weight of every child in this survey. Only the inside of the road-to-health card is seen here. You will see that Card A has dots for the weights of 103 children who are under 3 years old. All but 1 of these children are on the road-to-health, and many of them are above it. From this card you know that almost all these are very well nourished children.

Card B is from a basti on the edge of a city. Most of the people who live in this basti are poor, and many have no job. The weights of 106 children from the basti are shown on Card B. You will see that 32 of these children, or nearly one-third, are below the road to health. These are the underweight or malnourished children of whom you will read in the next chapter.

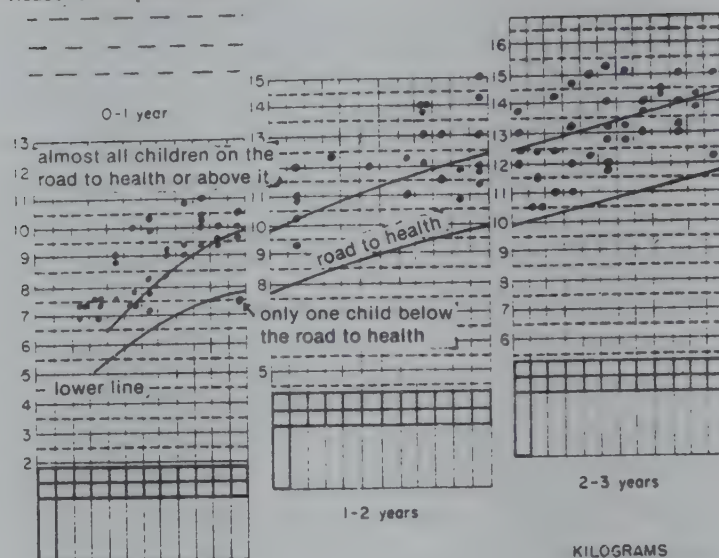
In doing a survey such as this, we count all children whose *dots touch the line* as being on the road to health. We start counting children at about 5 months of age where the road to health begins.

Teaching is the Most Important Part of Using the Road-to-Health Card

1.11 We use the road-to-health card to see if a child is well nourished and is growing. If a child is underweight and is not growing, we have to teach his mother how to feed him in a good, healthy way. Weighing a child does nothing if we do not use that information. We must teach mothers about the weight card and teach them to keep it carefully and to bring it with them every time they come to a hospital or clinic. Be certain that the mother knows all

A
Children From
Area of a City
Where
Government
Workers Live

Reasons for special care



B
Children From
A Basti on the
Edge of a City

Reasons for special care

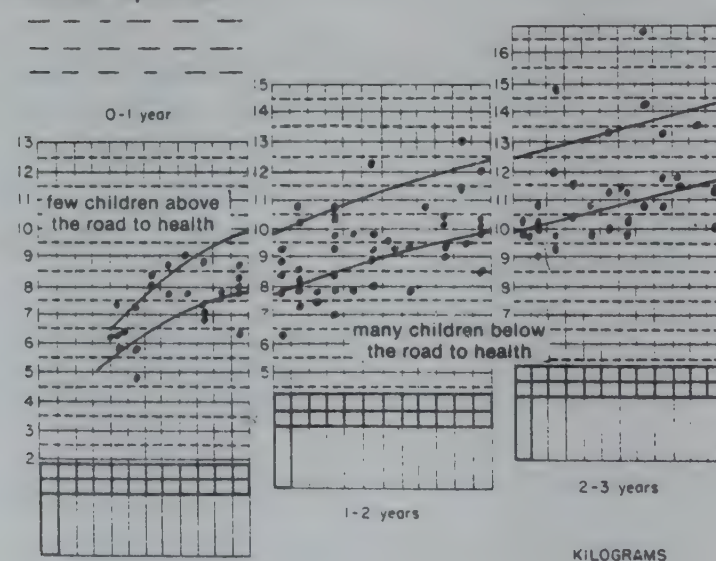


Figure 1.14
Using the Road to Health Chart
to do a Community Nutrition Survey

about every measurement of weight you take of her child. Attempt to make certain the mother understands all about the road to health and its importance to her child.

When you say to a mother that her child is falling off the road to health, you should be as careful and as kind as you can. Let the mother know clearly the reasons why her child is ill, but if possible do not make her afraid.

You should remember that teaching a mother about the growth of her child is important, and teaching her *how* to feed her child is the most important. Putting a child's weight on a card does no good if the mother does not use the knowledge to help her child grow properly.

When you weigh a child regularly and put his weight on a weight card, you and his mother will be able to see if he is growing well and is healthy. When a child is healthy and is growing well, you know that you are probably teaching his mother in the right way.

Using Arm Circumference to Measure a Child's Nutrition

1.12 If you understand the idea of a weight-for-age graph, you will easily understand the idea of an *arm-circumference-for-age graph*. When we measure around something, we say that we are measuring its circumference. In the next chapter you will see how a healthy child has thick arms, how an underweight child has thin arms, and how a *marasmic* child has very thin arms. We can measure a child's nutritional health by measuring the thickness of his arms. This is easy to do. All that we have to do is to put a *tape measure* around a child's upper arm and measure how many centimetres go around it. (We can write centimetre as cm) You can see how to use the tape measure in Figure 1.15 on this page. A healthy child will have thick arms and a big arm circumference. A thin malnourished child will have thin arms and a small arm circumference. Even if the lower part of the arm of a malnourished child with kwashiorkor is big with water, the upper part of his arm will be thin and he will have a small arm circumference.



Figure 1.15

Measuring the Arm Circumference

Figure 1.16 below is a graph that has the arm-circumference-for-age of healthy children. You will see that, as in the weight-for-age graph, there is a line at the bottom for a child's age from 0 to 60 months. But on the line at the left is the arm circumference in centimetres (cm), with 0 at the bottom of the line and 17 cm at the top.

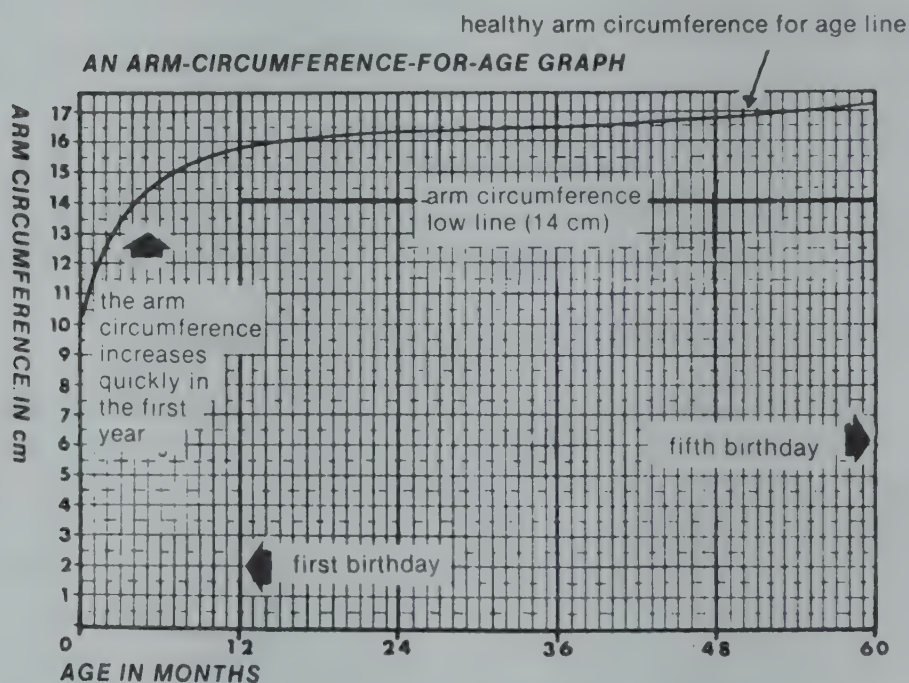


Figure 1.16

An Arm Circumference For Age Graph

You will see that there is a line named the "healthy-arm-circumference-for-age line" on this graph. It starts at 10.5 cm, which is the arm circumference of a healthy child at birth. The line goes up quickly after birth, and when a child is 1 year old his arm circumference is nearly 16 cm. So you can see that a child's arm gets much thicker in his first year. But, in the next 4 years of a child's life, from the time he is 1

till the time he is 5, the line on the graph is nearly flat. You can see from this line that his arm circumference goes only from a bit under 16 cm to a bit over 17 cm in these 4 years. We see, then, that a healthy child's arm circumference grows only a small amount more than 1 centimetre from the time he is 1 to the time he is 5. This is very useful because when a child is between 1 and 5, his arm circumference should be between 16 and 17 cm. If a child's arm circumference is smaller than this, his arm is thinner than it should be and he is malnourished. Thus, there is no need to know a child's exact age which is very useful because, as we have seen before, exact age is often difficult to find out.

Look back to the weight-for-age graph (Figure 1.5 on page 8). You will see that the healthy-weight-for-age line, like the healthy-arm-circumference-for-age line, goes up very quickly from birth to the age of 1 year. But because it goes on climbing after that, it is not like the healthy-arm-circumference-for-age line which is quite flat after the age of 1 year. This is only a way of saying that a healthy child keeps on getting heavier between the age of 1 to 5 years, but the circumference of his upper arm does not change much. A different way of saying this is to say that between the ages of 1 and 5 a child's arm circumference does not depend on his age. This is useful because between 1 and 5 years a child is usually in the most danger from malnutrition. In addition, it is usually easier to measure a child's arm circumference than to weigh him. This is because a *tape measure* is cheaper and lighter to carry than a scale. You can even make a measure from a piece of thin *cardboard*. You see that the arm circumference can be a very useful measure of nutrition.

When we think about weight for age, we know that every 1-year-old child does not weigh exactly 9 kg. Some weigh a bit more, and some a bit less. In the same way, not all healthy children have an arm circumference which is exactly 16.5 cm. They are not all exactly on the healthy-arm-circumference-for-age line, but they are at all times quite near to it. In Section 1.8 about weight-for-age, we saw that we can think of a child as being malnourished if he is below the lower line of the road-to-health card. In the same way, we can think of a child as being malnourished if his arm circumference is below the lower line on the arm-circumference-for-age graph (see Figure 1.16 page 26 for example). This line is the 14 cm line, and we will name it the lower line. It is useful to remember that a child between the age of

1 and 5 is malnourished if his arm circumference is less than 14 cm.

*AN ARM CIRCUMFERENCE OF LESS THAN 14 CM
SHOWS MALNUTRITION IN A 1 TO 5-YEAR-OLD CHILD*

The arm circumference cannot be used to see if a child is growing because it does not change much for some years, even in a growing, healthy child. The most important use of the arm circumference is in a community nutrition survey. In Figure 1.17 (see next page), you can see the arm circumferences of the same children from a city and the basti that you saw in Figure 1.14 (page 24). The only differences in these 2 figures are that arm circumferences for children under 12 months of age are not on the graphs, but they are for the fourth and fifth years as well as the second and third years. You will see that most of the city children are on top of the healthy-arm-circumference-for-age line, while nearly all the basti children are below it. Of the 116 city children in Graph A, only 4 are below the lower line (14 cm). Of the 124 basti children, 34 are below the lower line. These graphs help us to see that the basti children have thinner arms than the city children and that nearly one-fifth are so thin that we know they are malnourished.

Most children who are below the lower line on the road-to-health card are below the lower line on the arm-circumference-for-age card. But weight and arm circumference do not measure nutrition or growth in exactly the same way, and they do not agree completely at all times. But you should remember that the children who are near to one or the other of the lower lines are not very well nourished; you can see that these two ways of measuring malnutrition agree quite well.

ARM-CIRCUMFERENCE-FOR-AGE GRAPHS

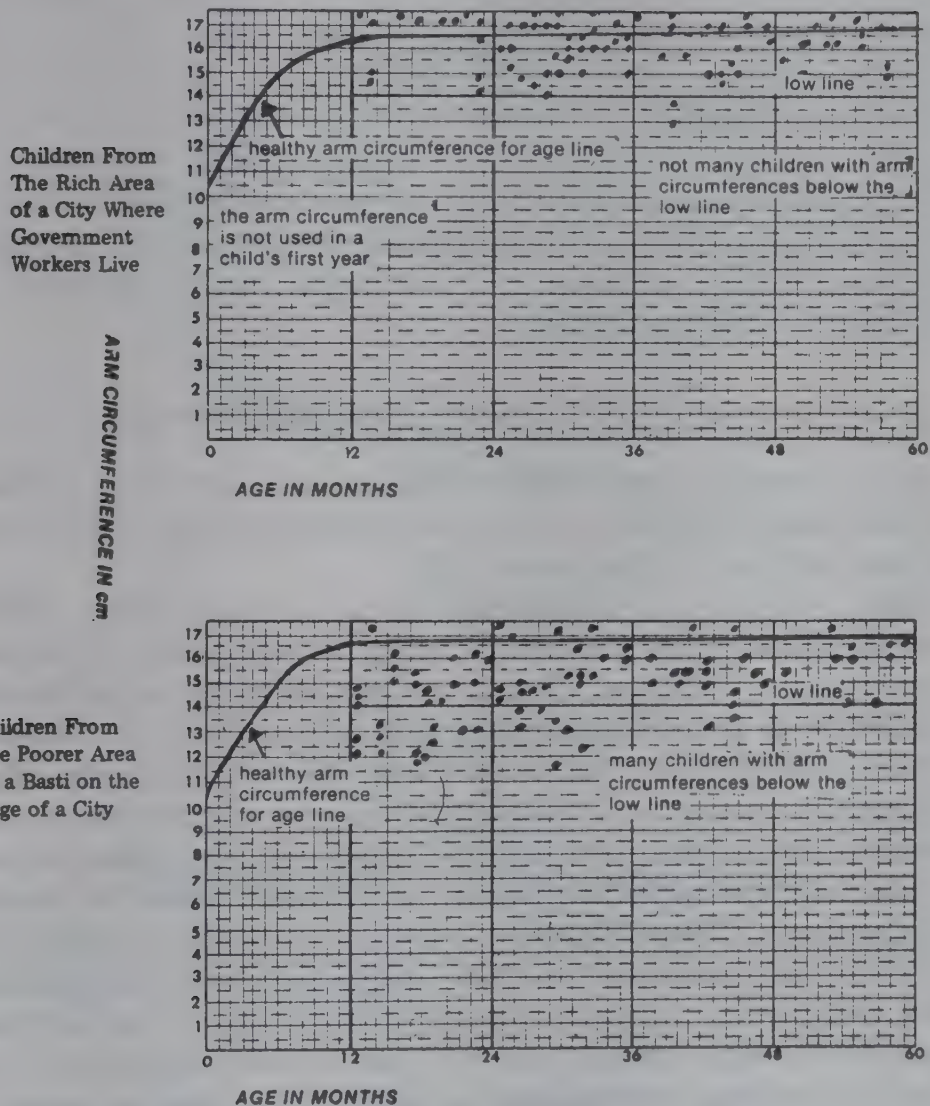


Figure 1.17

A Community Nutrition Survey Using Arm Circumference

THINGS TO DO

1. *Make a height-for-age graph for some maize (Makki) plants.*

Some people find it difficult to fully understand a weight-for-age graph. It may help them to make a different kind of graph. It will be an height-for-age graph, not weight-for-age. Plant some maize in a box of earth. Put water on them when it is needed. Measure the height of 1 maize plant in centimetres every week. Take a clean paper and write the weeks — 0, 1, 2, 3, 4, in a line at equal distance (for example, 1 cm) from the others on the bottom of the page and the height centimetres in a line up the side. Your graph will start at 0, and the line for the height of your maize plant will slowly climb up the paper. Even as some children are heavier and grow more quickly than others, so some of your maize plants will grow more quickly and be taller than others.

2. *Do a community nutrition survey using weight-for-age.*

Do a nutrition survey using weight for age. Let some people do it in a rich area, and some in a poor area such as a basti. Use a road-to-health card and put dots for every child.

When you go to a community, if it is rich or poor, attempt to give all houses equal chances of being in your survey. This is not easy all the time. Go from house to house and weigh all children you can. Attempt to get at least a hundred children (100). Often the malnourished children stay in the houses while the well-nourished children are brought for weighing. Because of this, you should attempt to get children in their homes. You should also go to poor houses as well as rich homes according to the balance of different kinds of homes in the community. If the children in your area are well-nourished, most of your dots will be above the lower line on the weight card and most children will be on the road to health or above it. If the children in your area are malnourished, many of them will be below the lower line on the card and off the road to health. You may be able to get road-to-health cards and to borrow a scale from an Under-Fives Clinic.

3. Do a community nutrition survey using arm circumferences.

Do your survey exactly as described above, but use arm circumference, not weight. If a number of people want to do a survey and they do not have enough scales, they can easily measure the arm circumference. This can be done with tape measure (Figure 1.18 see below) or even with a narrow piece of thin *cardboard* marked in centimetres.

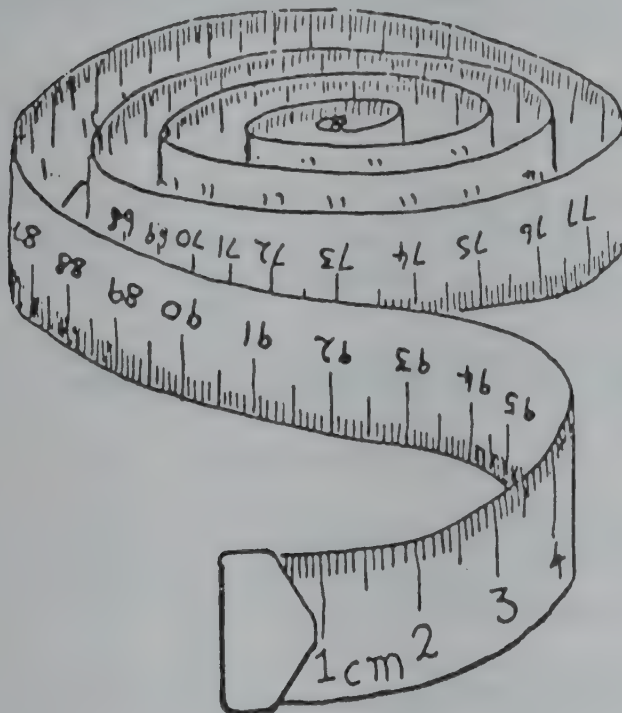


Figure 1.18

A Tape Measure for the Arm Circumference

Remember these things when you measure the arm circumference, and look at Figure 1.15 on page 25.

If you can, use a cloth or, even better, a "fibre glass" tape measure which does not stretch.

Put your tape gently but firmly round the arm, and do not pull so tight that wrinkles come in the skin.

Always measure the left arm, half way between the shoulder and elbow.

Let the left arm hang straight down by the child's side.

The arm must be straight and not bent at the elbow.

You can put down your answer in two ways. One way is to copy the graph in Figure 1.17 (page 29) and put a dot for every child. But to do the survey in this way, you need to know every child's age. The good thing about using arm circumference is that we do not need to know a child's exact age. We only need to know that he is between 1 and 5 years old. Another way to do the survey is to measure the arm circumferences of many children and put them into groups as has been done in Figure 1.19 below. Put a line for every child and count in "fives." Do this by putting every fifth line across the other four. This kind of count is named a *tally* and makes counting more easy.

arm circumference in centimetres		numbers of children
18 - 19		2
17 - 18		2
16 - 17		19
15 - 16		32
14 - 15		21
----- 14 cm -----		
13 - 14		15
12 - 13		8
11 - 12		1
		<hr/> 100

Figure 1.19

A Tally for the Arm Circumference

In a well-nourished area there will be a very small number, if any, of children with an arm circumference below 14 cm. When the nutrition of the area is bad, there will be many children below 14 cm and there will be a very small number of children with arms that are fatter.

4. *Weigh children in an Under-Fives Clinic*

Attempt to go to an Under-Fives Clinic at least once a month and help to weigh the children and fill in their road-to-health graphs.

After you know how to make a graph, talk all about the graph to the person who is teaching you. Next time talk to the mother all about the graph. Attempt to give as much time as needed to her, give her the right knowledge and help about feeding her child, and talk to her about the road-to-health graph till you are certain she understands. Be certain she knows when to bring her child back again.

5. *Change a local calendar to the Western Calendar, making a double calendar.*

In this chapter, we have said much about a child's weight for his age, but to find this out we have to know a child's age. A good way to do this is to use a local (double) calendar, as explained in Section 1.5.

Make a new double calendar for every place because the people in different areas use different calendars and have the same festivals at different times.

**EVERY "WELL BABY" OR UNDER-FIVES CLINIC
MUST HAVE A DOUBLE CALENDAR**

Change your double calendar every year because sankrants and festivals change on the Western Calendar every year.

A double calendar is needed for at least 5 years and has to be made very carefully month by month. Many clinics will find it useful to have a double calendar giving the most important events of the year for the last 5 years.

To make a double calendar may seem difficult, but this chapter helps you to see that one of the most important things that we can know about a child is his true age.

Arm Circumference Tapes are available in India from Voluntary Health Association of India, C-14 Community Center, SDA, New Delhi-110 016

CHAPTER 2

WHEN GROWTH FAILS

The first chapter was about how a child grows. We saw how a healthy child is at all times about the right weight for his age and how a child who is growing gets heavier every month. This chapter is about what happens if a child does not grow as he should.

The Underweight Child

2.1 If a child does not get to eat enough of the right foods, he does not grow. If he does not weigh as much as he should for his age, we say that he is “underweight for his age.” On the road-to-health card, the dots for his weight come *below* the lower line. We name a child who does not weigh as much as he should for his age “the underweight child” (see Figure 2.1 next page). In many parts of India, 40 children in every 100 are much underweight for their ages, and there are villages, places, or panchayats where even more than 40 children in every 100 are underweight.

Why should we worry about children being underweight? There are 3 reasons why the underweight child is important.

Reason 1: An underweight child becomes ill and dies more easily.

2.2 Nobody has any doubt about this. When an underweight child becomes ill with a disease such as measles, it is more possible that he will die than it is that a big, strong, well-nourished child will. An underweight child cannot fight diseases so well. Some people like to think of an underweight child as being like a house in which the ants have eaten all the sticks (shateer). The house in Figure 2.2 looks very strong and stands up all through the dry months of the year, but when the rains come the roof falls in and the house is badly damaged. A strong house in which the sticks have not been eaten by the ants is not harmed by rain. In the same way, an underweight child may *look* strong, but if he gets measles or some other disease, it may kill him. A strong, well-nourished child is less harmed by diseases and gets well again almost every time. This idea of a house in the rain is a good one to use when you teach mothers.

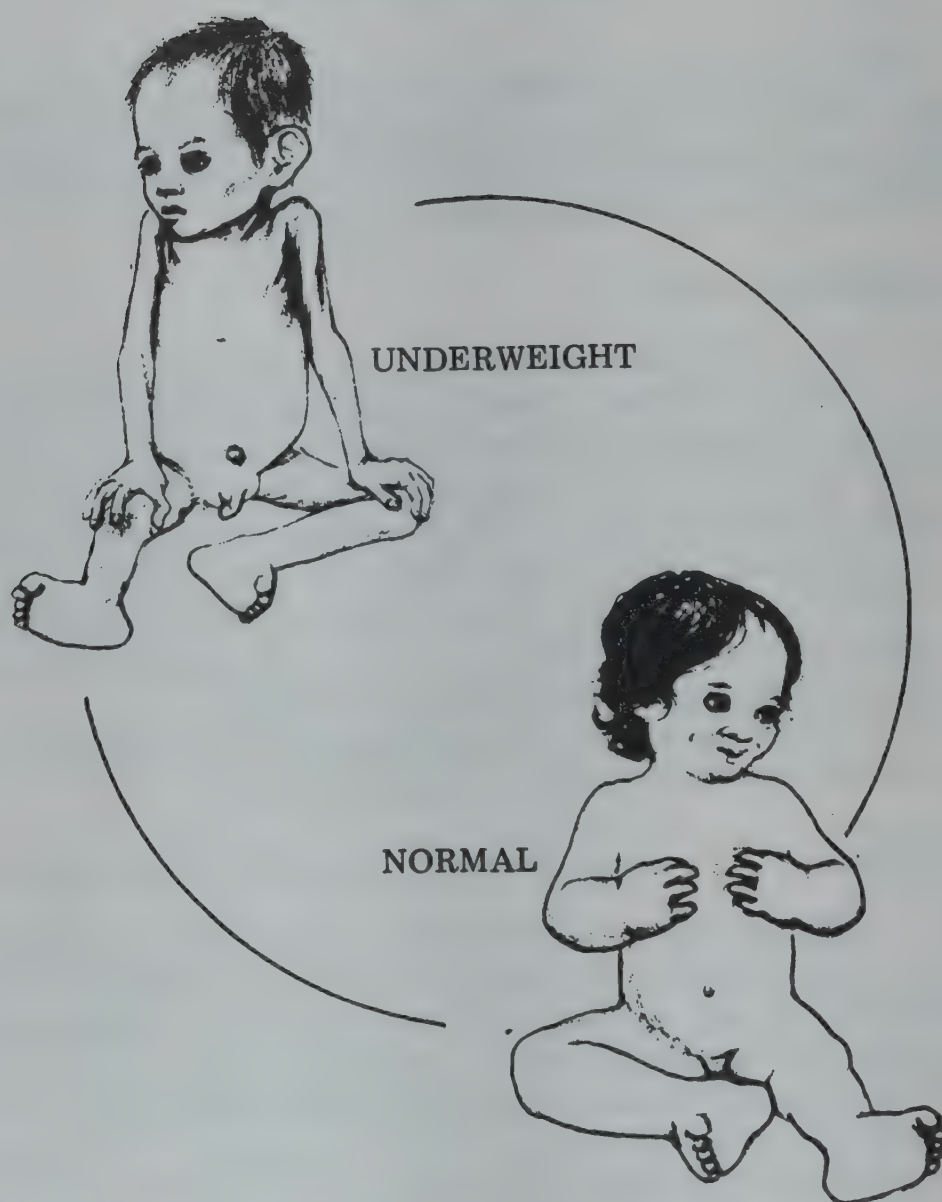


Figure 2.1

THE UNDERWEIGHT CHILD

In countries where children are well-nourished, they hardly ever die from measles. A good saying to remember is that a community is malnourished as long as children die from measles.

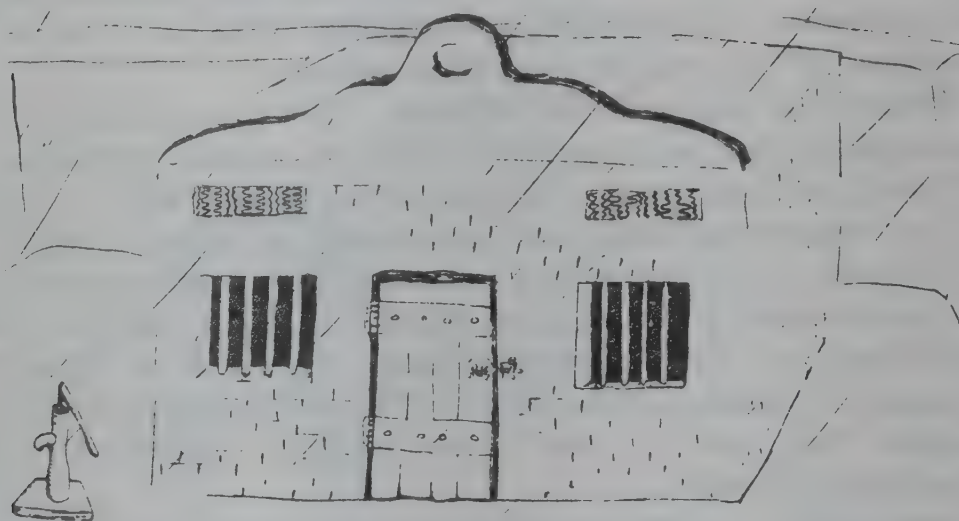
Measles is an example of an *infection*. By this we mean that it is a disease caused by a very small living thing or organism getting into a child's body and living there. Because "micro" means small, we name these very small living things *micro-organisms*. A different name for them is *germs*. A person with a micro-organism living inside him is said to be *infected* by that micro-organism. Not all diseases are caused by infections, but many important diseases of children are infections. Most kinds of diarrhoea, tuberculosis (TB), and whooping cough are infections. Every one of these diseases is caused by infection with a different micro-organism.

Malnourished children get other infections in addition to measles more seriously than if they were well-nourished. They get diarrhoea and tuberculosis much more frequently and die from them more easily. In one district, underweight children were found to get diarrhoea 4 times more often than well-nourished children. One good way to prevent diarrhoea is to make certain that all children are well-nourished and are on the road to health.

<p><i>UNDERWEIGHT CHILDREN DIE FROM INFECTIONS MORE EASILY</i></p>
--

Reason 2: An underweight child does not grow up as tall and strong as he would if he had been well-nourished.

2.3 We can be very certain about this statement. Height does not matter nearly as much as cleverness or being able to fight a disease. But most people do like their children to grow tall. People would be taller than they are now if everyone had been well-nourished when they were children. One hundred years ago many people in Europe were malnourished and adults were quite small. There is now nearly no malnutrition in Europe and people are taller than they used to be. If we can stop malnutrition the Indian of the future will be taller than the Indians of the present. This does not matter much to some people but if you do think it matters, then here is one more reason for attempting to prevent malnutrition.



A strong house stands up well against the rains as a well nourished child stands up to measles and other diseases



A malnourished child is like a house in which the ants have eaten all the sticks (shateer)

Figure 2.2

Reason 3: An underweight child may grow up less clever than he should be.

2.4 If a child does not eat enough of the right kind of the body-building food, his body and his brain do not grow as well as they should. Though malnutrition is bad all through a child's life, it is worse near the time of birth and during the first 2 years of its life.

Malnutrition around the time of birth: A baby's brain grows very rapidly just before he is born (while he is still in his mother's body) and through the first months of life after he is born. His brain may not grow as well as it could if his mother does not eat enough food to give him what he needs while he is still in her body, and he will not grow as well as he could if he does not get enough to eat soon after he is born.

In addition, malaria can cause a baby to be malnourished in the womb. This is how it happens. A baby in his mother's womb is nourished through the cord (the umbilical cord) that joins him to the placenta (afterbirth). All through pregnancy the placenta sticks close to the side of the womb, and nutrients (see Section 3.1) from the mother go through it on their way to the child. If a mother has malaria it can harm the placenta, and this will stop nutrients from getting to the baby. He does not grow well and frequently is not as heavy when he is born as a baby with a healthy placenta. Now we can see why malaria is an important cause of malnutrition inside the womb. This is why, where malaria is common, pregnant mothers should every time be given tablets against malaria. This is an important kind of malnutrition, and it is easy to stop it before it starts.

Malnutrition before school: A child has many things to learn in the first 5 years of his life before he goes to school, such as learning to walk, and talk, and play. If he does not get enough food at this time, he becomes sleepy and dull and does not run about and talk like a well-fed child of his age. Frequently a malnourished child starts to walk later than he should or he may stop walking if he started to walk before becoming malnourished. Such a child is not very interested in things and events near him and he does not play well. A child learns much from playing and talking with his family. If a child is dull and sleepy because he is malnourished, then his family is not very interested in him and does not play with him. So a malnourished child does not learn from his family or play as he should. When a child goes to school,

he finds that other children who have been well fed in the years before they came to school learn more than he does.

Malnutrition at school: In addition to nutrition of a child before he goes to school, nutrition of the child at school age is important. If a child is not well fed, he is hungry, sleepy and dull, and he cannot think well in school. A child will learn more if he is well-nourished than if he is malnourished.

Now we can see that a child who is malnourished while he is in the womb or before he goes to school or while he is at school does not grow up to be as clever as he should be. We can say this in another way. A child who is malnourished and underweight will often grow up to be less able and less bright than a child who has been fed well and has at all times been the right weight for his age. Good nutrition is important so that every child can learn as much as it is possible for him to learn.

Malnutrition and Development

2.5 If a country is going to go forward and develop quickly, every adult and every child who will grow up to be a man or woman needs to be as clever, as able, and as skillful as he can be. This matters not only for the small number of people who are going to do the special jobs, like being doctors, engineers and businessmen, but it matters for the many people who are going to do the more ordinary jobs. A country needs good farmers, builders, typists, mechanics and drivers. All these jobs have to be learned, and a clever person can learn them and do them in a better way than one who is not as clever. The more skillfully all jobs are done, the more quickly a country will develop. If the workers of a country have been made slow by malnutrition in childhood, the country will not go forward and develop as fast as possible. In this way malnutrition slows development. Countries where many children are malnourished go forward more slowly than they should.

So far, we have talked only about malnutrition slowing development of children. But in addition you will see how development is slowed when adult workers are malnourished. Many workers, farmers more than others, are malnourished and are not able to work as hard as

they could if they were well-nourished. They do not have the food that they need to be able to work hard. When workers are malnourished and they cannot work hard, the country cannot go forward as it should, and development slows. We see, then, how malnutrition in adults, as well as malnutrition in children, slows development.

MALNUTRITION SLOWS DEVELOPMENT

Measuring What Malnutrition Does

2.6 It is not easy to measure what malnutrition does to make a person less clever. This is partly because cleverness itself is not easy to measure, and partly because it takes a long time for children to grow into adult men and women. We can weigh a child now, but we have to wait 15 years before we see if the underweight child grows up less clever than a child who is the right weight for his age. But even though it is difficult to be very certain, more and more people think that the underweight child does grow up less clever than he should have been. If we wait 15 years before we do anything, many children will have grown up less clever than they should have been. It will not then be possible to do anything about them. If there were only a few underweight children, it would not be very dangerous for the country. But because there are so many of these children, we must do now all we can to make their nutrition good. This is why many people worry about malnutrition and want to prevent it, and this is the reason why this book has been written.

*UNDERWEIGHT CHILDREN MATTER
BECAUSE THERE ARE SO MANY OF THEM*

An underweight child is in danger of getting even more malnourished. If his malnutrition gets more serious or if he gets diarrhoea or some other infection, he may become so malnourished that he gets the very serious kinds of malnutrition named *marasmus* or *kwashiorkor* (Section 2.9 and 2.10). He may die because of this. We can see then why the underweight child is in danger all the time.

**UNDERWEIGHT CHILDREN CAN BE FOUND
ONLY BY WEIGHING THEM**

The Importance of Weighing

2.7 We cannot know if a child is underweight if we only look at him; he must be weighed. Many times an underweight child looks healthy, usually like a healthy child a month or two younger. It is only when we see him standing next to a healthy well-fed child of the same age that we see how small he is. Frequently there are so many underweight children in a community that we forget what truly healthy well-nourished children look like. This is why it is so important to weigh a child, to find out how old he is, and to check his weight for age on the road-to-health card (Figure 2.3 opposite). This is what the road-to-health card is for and why it is useful; it is the only way to find the underweight child! We cannot know by looking at him if a child is underweight, and his mother cannot know. A mother may bring her child to a clinic because he has a cough, diarrhoea, or "feels hot" (fever). Sometimes the mother is worried about swelling of the legs when the child has kwashiorkor. A mother does not usually bring a child to a clinic because the child is thin and underweight. There may be so many thin, underweight children in a village that mothers think it is right for their children to be like this.

As mothers sometimes do not know when their children are underweight, doctors, nurses, auxiliary nurse midwives (ANM's) or lady health visitors (LHV's) in addition sometimes do not know. This means that every child coming to a clinic or hospital must be weighed and given a road-to-health card. The mother should be asked to bring them

CURVE CARD

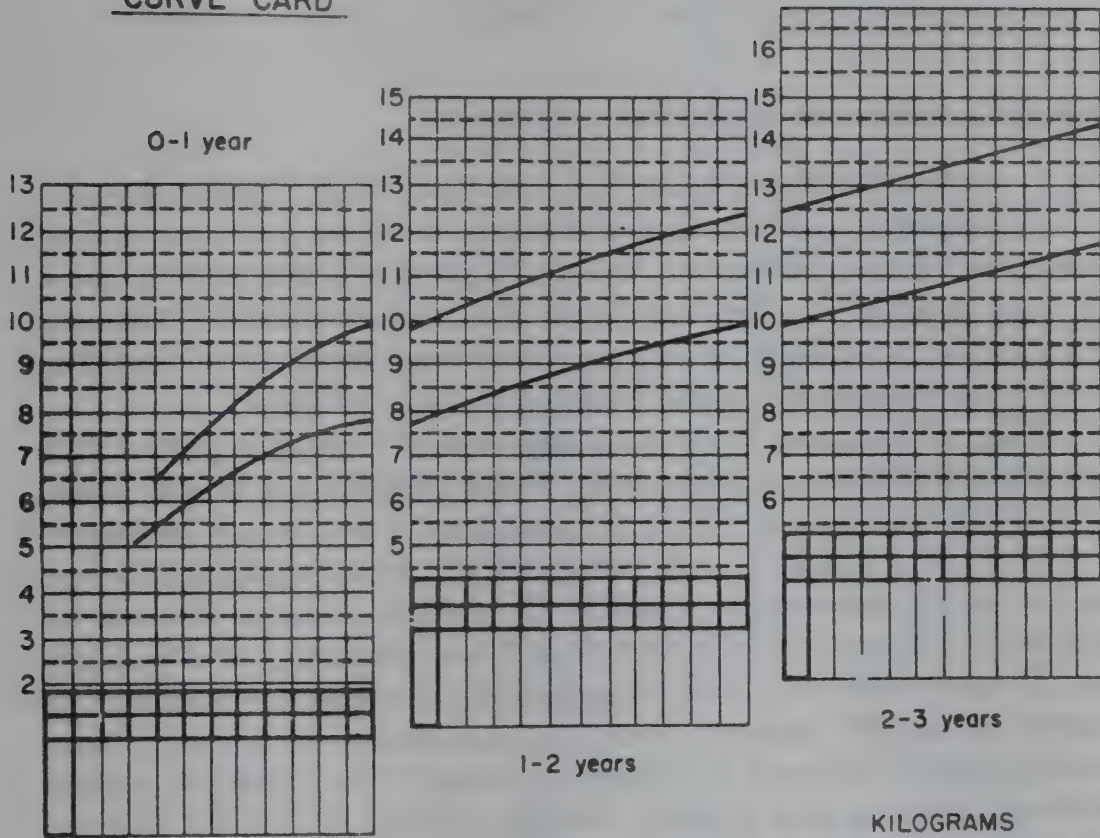


Figure 2.3
The Road-to-Health Card

to the Well-Baby Clinic. It is very, very important if the children are underweight, but it is important for children to come, underweight or not.

*EVERY CHILD COMING TO A HEALTH CENTRE
OR HOSPITAL MUST HAVE A WEIGHT CARD*

How Many Malnourished Children Are There?

2.8 Some children get all the food they need. These are the healthy, well-nourished children who are on the road to health. But many children do not get the food that they need to grow and keep healthy and they are below the road to health. These are the underweight children whom you have read about in this chapter, and they are important because there are so many of them.

Many children eat such small amounts of food of any kind that they get a disease named *marasmus*. Some children eat enough food, but it is the wrong kind of food, because there is not enough protein in it. They get a disease named *kwashiorkor*. In a community where there is much malnutrition, possibly 40 children in every 100 will be underweight, possibly 5 out of 100 will have *marasmus*, and possibly only 1 out of 100 will have *kwashiorkor*. Because the nutrition of children is greatly different from one community to another, these numbers will be different in different districts. In a district where the nutrition is not as bad, possibly only 20 in every 100 of the children will be underweight, 1 will have *marasmus*, and there may be only 1 child in 500 with *kwashiorkor*.

In many countries, only about 7 out of 10 children live till their fifth birthday; in other words, 3 children in every 10 die. Some die soon after birth. Many die because they are malnourished or because diseases like measles make them die when they are underweight. Of the 7 children who live, possible 3 will have malnutrition at some time before they are 5 years old and may not grow up as clever as they should be (see Figure 2.4 opposite).

*THE NUTRITION OF CHILDREN IS GREATLY DIFFERENT
FROM PLACE TO PLACE AND FROM TIME TO TIME*

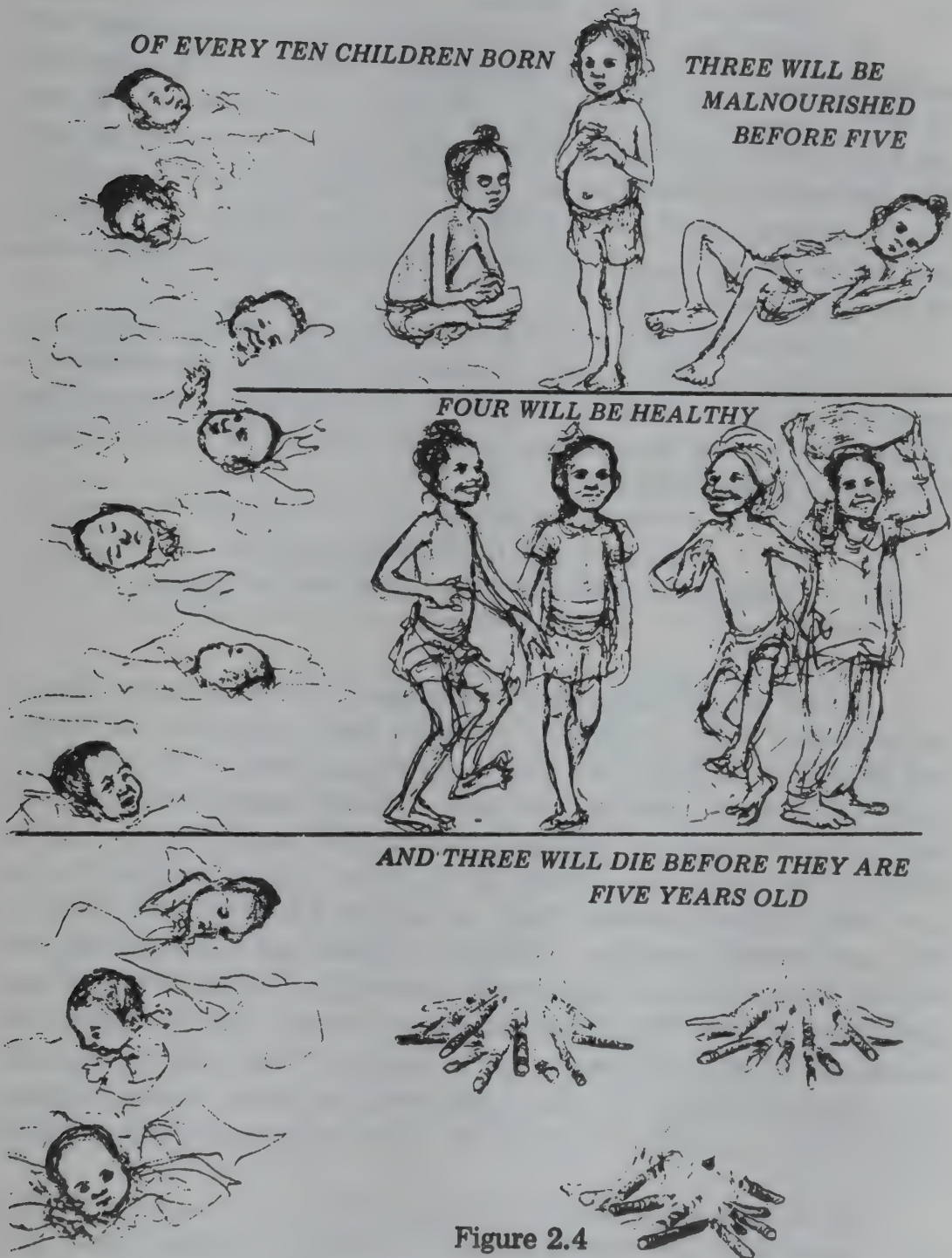


Figure 2.4

Marasmus

2.9 Marasmus is only another word for not eating enough food of any kind. A child with marasmus is at all times very underweight and sometimes weighs only half as much as he should for his age. Look how thin the child is in Figure 2.5 opposite. His arms and legs are like sticks and you can see his ribs. His muscles are very thin and his arm circumference (Section 1.12) is very, very small. It may be as small as 10 cm, not the usual 14 cm or more. The child's face is thin like the face of an old man, and his head looks big because his body is so small.

A healthy child has much fat under his skin. This is what makes his body so round and smooth. A child with marasmus has almost no fat under his skin because he eats such a small amount of energy food (Chapter 4) that he has nothing extra to keep as fat under his skin. This is why he looks so thin.

*CHILDREN GET MARASMUS BECAUSE
THEY DO NOT EAT ENOUGH FOOD OF ANY KIND*

A child can get marasmus at any age, but the common time is in his second year. Mothers do not want their children to be hungry, but frequently they do not give them enough food in this important year. As you will read in this book, mother's milk is enough for a baby up to the age of 4 months. After this he needs porridge, such as dahlia or suji or kichri (see glossary). Many village mothers do not give their children porridge from the age of 4 months on; others do not give enough porridge. So their children get marasmus in their second year. In towns some mothers attempt to bottle feed, but they give their children thin milk with much water. These children get marasmus in their first year. Bottle feeding a baby when his mother has enough breastmilk is one of the most important reasons to cause malnutrition, specially in rural areas. We shall discuss this in detail later.

Marasmus and kwashiorkor are different in one more way. A child gets kwashiorkor very quickly in 2 to 4 weeks, and soon is dead or is healthy again. A child with marasmus takes a long time to get well or die.

Figure 2.5



THIN OLD MAN'S FACE
BIG ANXIOUS EYES
THIN MUSCLES AND FAT
NO SWELLING
VERY UNDERWEIGHT

MARASMUS

FAT FACE
UNHAPPY, MISERABLE
CHILD
THIN UPPER ARMS
SKIN COMING OFF LEGS
SWOLLEN LEGS



KWASHIORKOR

Kwashiorkor

2.10 This is an African word which comes from Ghana. It means “illness of the displaced child.” By displaced we mean that a child has been taken away from his mother’s breast because she has a newborn baby or has stopped breast feeding while she was pregnant again.

A child with kwashiorkor does not usually look thin. He may have much fat under his skin which makes his body look round and his face look fat. His legs and hands may look fatter than they should because they are swollen with water (*oedema*), and if you push on the leg of a child with kwashiorkor your finger may leave a hole or dent. A child may look fat but really he is thin because his muscles are thin and weak. His stomach may look big and fat. This is because the muscles of his stomach are thin and weak and do not hold his stomach well. If you look at his shoulders and the tops of his upper arms you can see that they are thin. His arm circumference is less than 14 cm almost all the time (Figure 2.5 page 13).

Frequently, the skin of a child with kwashiorkor becomes paler than it should. It becomes thin and weak and may start to come off, like old bark from a tree. His hair becomes yellow and thin and may be easy to pull out. He is sad looking, sits quietly in his mother’s arms, and does not want to run about and play. Sometimes he even stops walking.

“*Kwashiorkor*” is another word for not eating enough of the body-building food named protein that is needed to make strong muscle, skin and blood (Chapter 3). A child with kwashiorkor usually weighs less than the right weight for his age, but some children may eat enough energy foods (Chapter 4) before they become sick so that they are quite fat. Because of this fat and the water that makes his legs swollen he may not be very underweight (Figure 2.6 opposite page). Sometimes a child like Satnam Kaur in Section 1.9 may even get kwashiorkor while she is still on the road to health.

Mothers sometimes think that any child who is fat must be well-nourished. When you are teaching mothers, you may have to let them see that a fat child with kwashiorkor is malnourished because he is eating the wrong kind of food. The child may be getting nearly enough energy food, but not enough protein food.



Figure 2.6

CHILDREN GET KWASHIORKOR BECAUSE
THEY DO NOT EAT ENOUGH PROTEIN

The most common **time** for a child to get kwashiorkor is when he is about 18 months old, but it can happen at other times, mostly when he stops breast-feeding.

Marasmic Kwashiorkor

2.11 So far, we have written as if all children had to be healthy or underweight, or as if they had to have marasmus or kwashiorkor. It is not all as simple as that. Some children have marasmus or kwashiorkor badly, some not so badly. Other children are half way between kwashiorkor and marasmus. They may possibly be very thin like a marasmic child and at the same time have their skin coming off like a child with kwashiorkor. These children are

said to have “*marasmic kwashiorkor*.” In some areas, most children will be like this and only a small number of children will have either “*pure*” marasmus or “*pure*” kwashiorkor. In addition, there may be many children who are between the “*underweight child*” and the child with marasmus or kwashiorkor. They will have only 1 or 2 of the signs of kwashiorkor.

Have you ever seen a lump of ice in a glass of water or cold drink? It floats so that most of the ice is under the water and only a small part is above it (see Figure 2.7 below). Malnutrition is like this. The small number of children with marasmus and kwashiorkor are the ones that we can easily see. They are like the small bit of ice which is above the water. The many underweight children we cannot see (if we do not weigh them and find out their ages) are like most of the ice lump which is under the water. These children are hidden in the community and we have to look for them.

Most children are underweight because they do not get enough to eat, but there are some who are underweight because they have some other disease. Because this is a book about nutrition, we will not say anything more about these children here. We shall discuss only those children who are underweight because they do not have enough to eat or do not have the right kind of food to eat.

malnutrition is like a lump of floating ice, only part of it can easily be seen

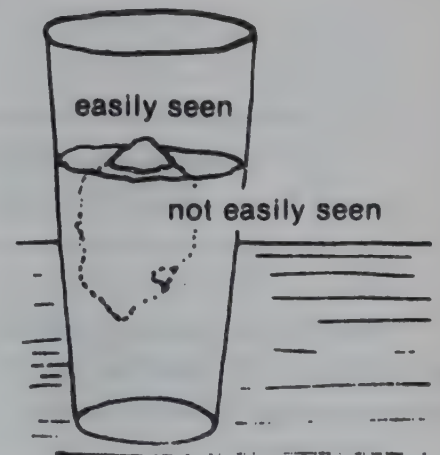


Figure 2.7

Protein Calorie Malnutrition or PCM

2.12 In the next chapter (Chapter 3) we will learn that the food which is used for building and repairing the body is named *protein*. Chapter 4 will let us know about the foods that give us the energy to run and work, the same foods which we store as fat under the skin. We will see that this energy is measured in calories. To be healthy and well-nourished a child must eat enough protein and enough calories of energy food. A child whose food does not have enough

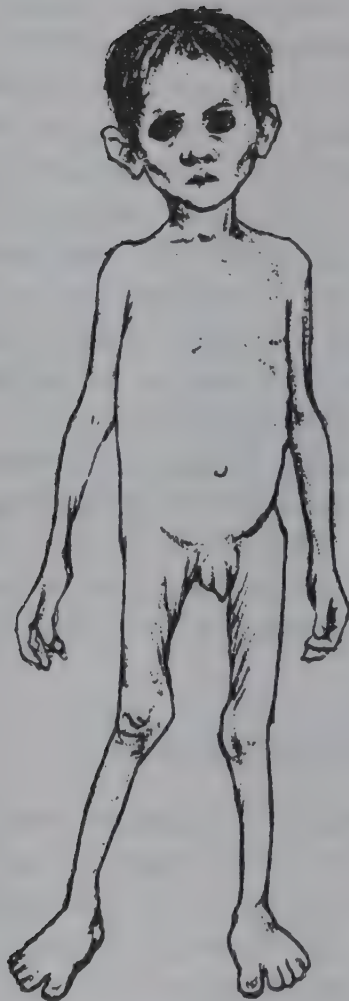
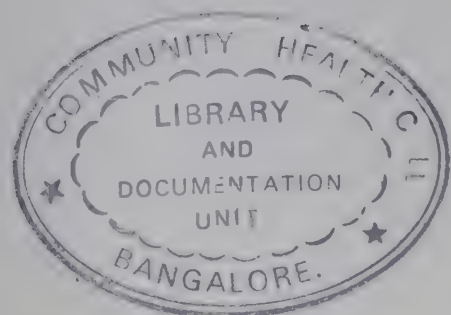


Figure 2.8
When Growth Fails

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protein and calories becomes malnourished. We say he is suffering from *Protein Calorie Malnutrition* or PCM. Some underweight children eat some protein and energy food, but they do not have enough, so they suffer from mild PCM. A child with marasmus is starving and does not get enough protein and enough calories of energy food: he has severe PCM. A child with kwashiorkor also has severe PCM; he does not get enough protein though he may get nearly enough calories. The underweight child suffering from mild PCM or the child with severe PCM who may have marasmus or kwashiorkor or the child with something in between, are all suffering from the condition named as Protein Calorie Malnutrition (PCM).

In many countries, of every ten children who are born, at least three die before they are five years old. Sometimes as many as half of all the children who are born die before they are five years old. Many of them die because they are malnourished and suffer from PCM. Frequently they die from marasmus or kwashiorkor or because some other disease such as measles makes them die when they are **weak**, underweight and malnourished. Almost no children need to die, and it is our job to work very hard to keep them living and healthy. In the two chapters that follow (Chapters 3 and 4) we will read about the foods that children need to make them grow and keep them healthy. But before we go on, it is useful to learn more about the weight card in malnutrition.

The Road-to-Health Card in Malnutrition

2.13 In the first chapter we learned how a healthy child is at all times near the right weight for his age, and how growth is more important than position on the road-to-health card. Now that we know about PCM, kwashiorkor and marasmus, we can make a comparison between the growth curves of some malnourished children and the growth curve of a healthy child.

You will see that the card is for 5 years, and that we have left out the months and only put in some of the weights.

Figure 2.9 below is the growth curve of a well-nourished child named Rajinder. You will see that her growth curve is near the healthy-weight-for-age line. She did not gain and sometimes even lost weight when she had infections, such as coughs or diarrhea, but she did not ever fall off the road to health. When she became well again, she even gained more weight than usual.

Reasons for special care

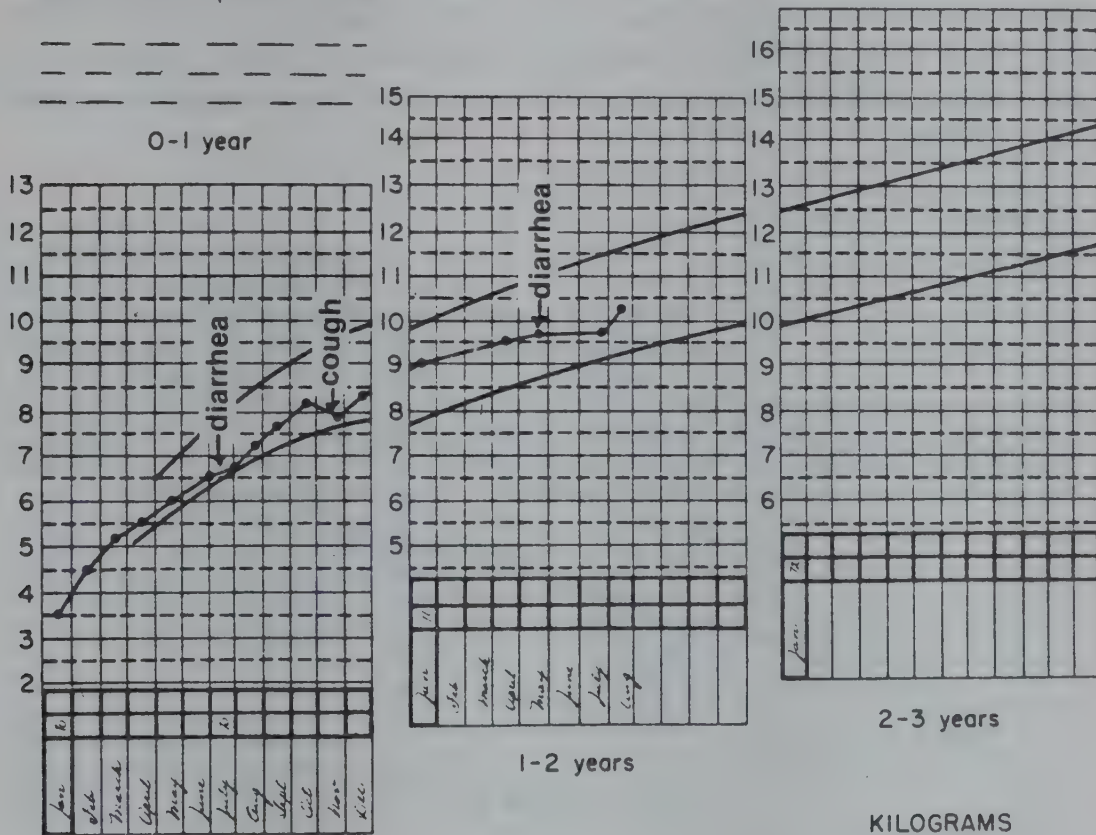


Figure 2.9
Growth Curve of Rajinder

In Figure 2.10 below we see the growth curve of Sukhwinder Singh. You will see that in the first 4 months of life, his weight followed the road to health. He is a very precious child, the only son after 10 years of marriage. His mother wanted to be very, very careful so she gave him only breast milk till he was 14 months old. After the first 6 months his growth slowed. He did not lose weight, but he did not gain nearly as much as he should. By the age of 14 months, he was very thin and weak. He had marasmus. At this age he had to go into the hospital where he was treated and cared for and his health became good. For one month he was in the ward where he was helped very much, and in that time his mother learned from the nurses how to feed him. They went home and after 2 months the child was again on the road to health.

Reasons for special care

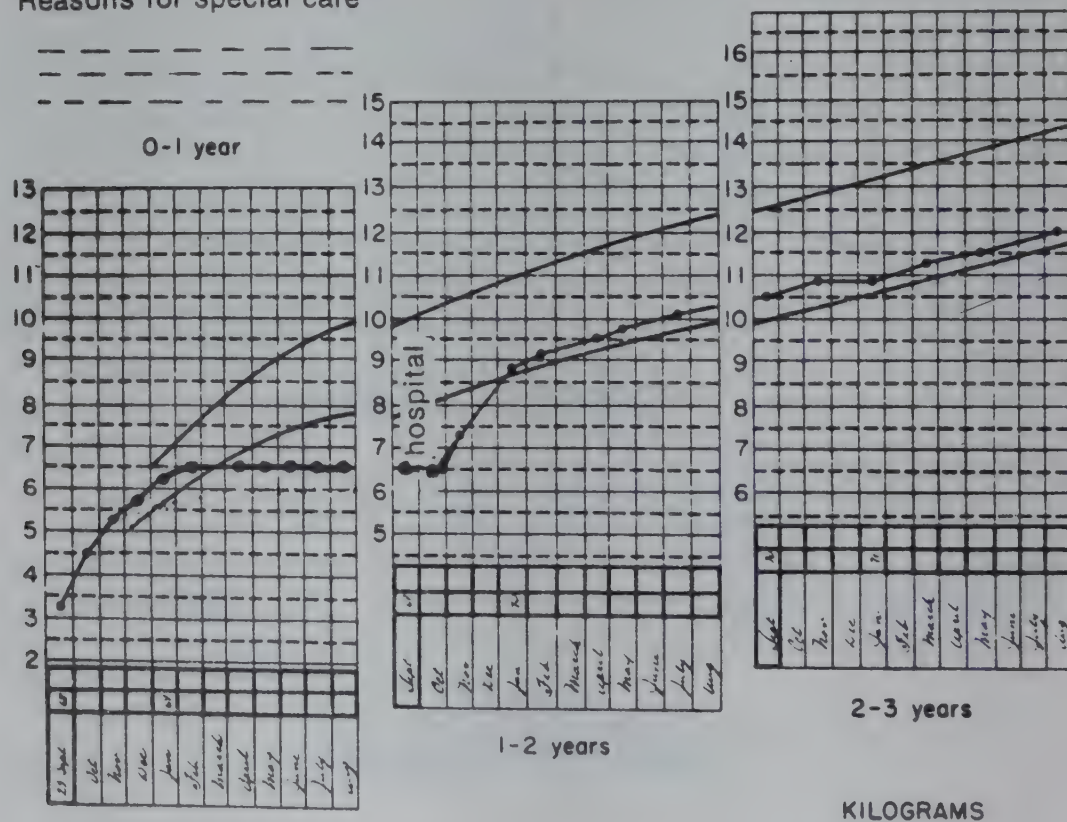


Figure 2.10

Growth Curve of Sukhwinder Singh

In Figure 2.11 below we see the growth curve of a child named Andrew. He was not given enough protein foods with his porridge after he became 4 months old. Like Rajinder, he had infections and lost weight, but he could not gain it again because he was not well fed. Because he did not have enough food to make him grow and to gain enough weight again after infections, his growth curve became flat. When he was 19 months old, he weighed only 7.5 kg and got kwashiorkor.

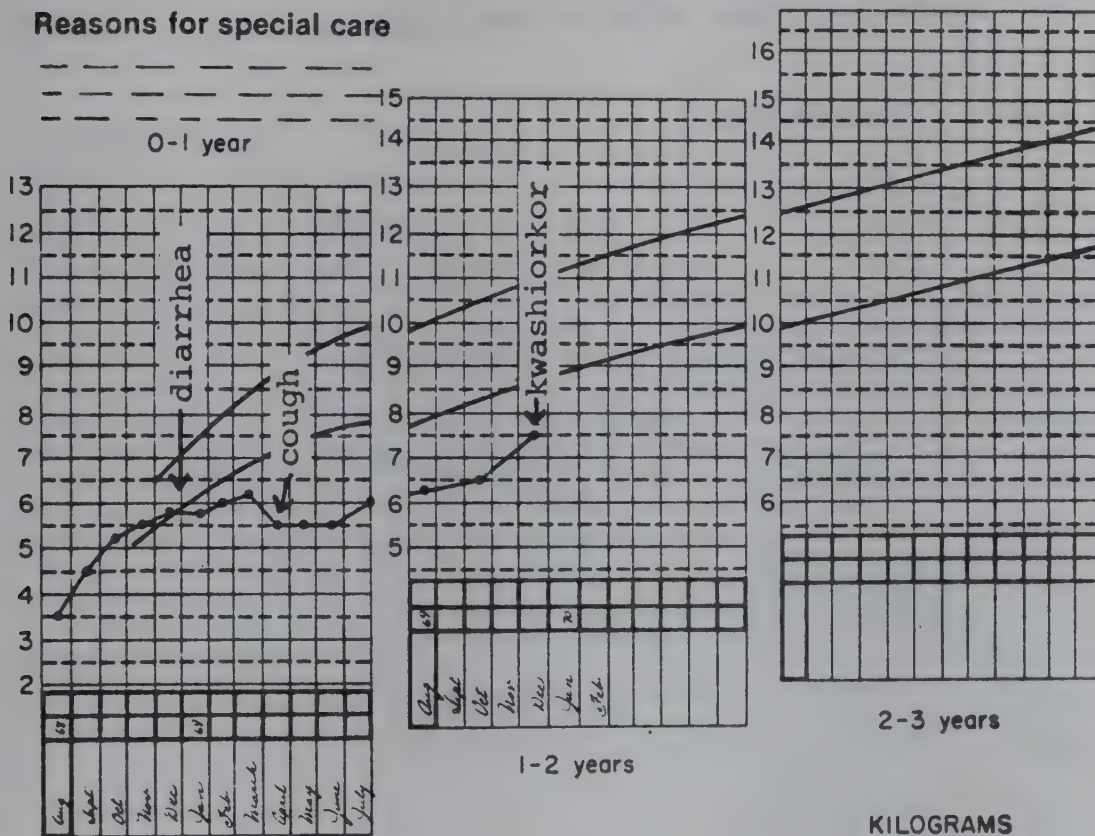


Figure 2.11
Growth Curve for Andrew

Many children who get kwashiorkor have a growth curve like that of Andrew. It is as if they were going on the road to PCM that is shown in Figure 2.12 below. You will see that children start on the road to health for the first 6 months while they are breast-feeding, but after the age of 4 months, they are not given enough porridge with protein foods. They stop growing, their weight curve becomes flat, and they go on the road to PCM.

The road to PCM is not printed on the road-to-health card, but a mother can understand it if you make a big teaching card and let her know all about it. As we saw with Satnam Kaur in Section 1.3, a child can get kwashiorkor at other places on the card, but the end of the road to PCM is the place where he usually gets it.

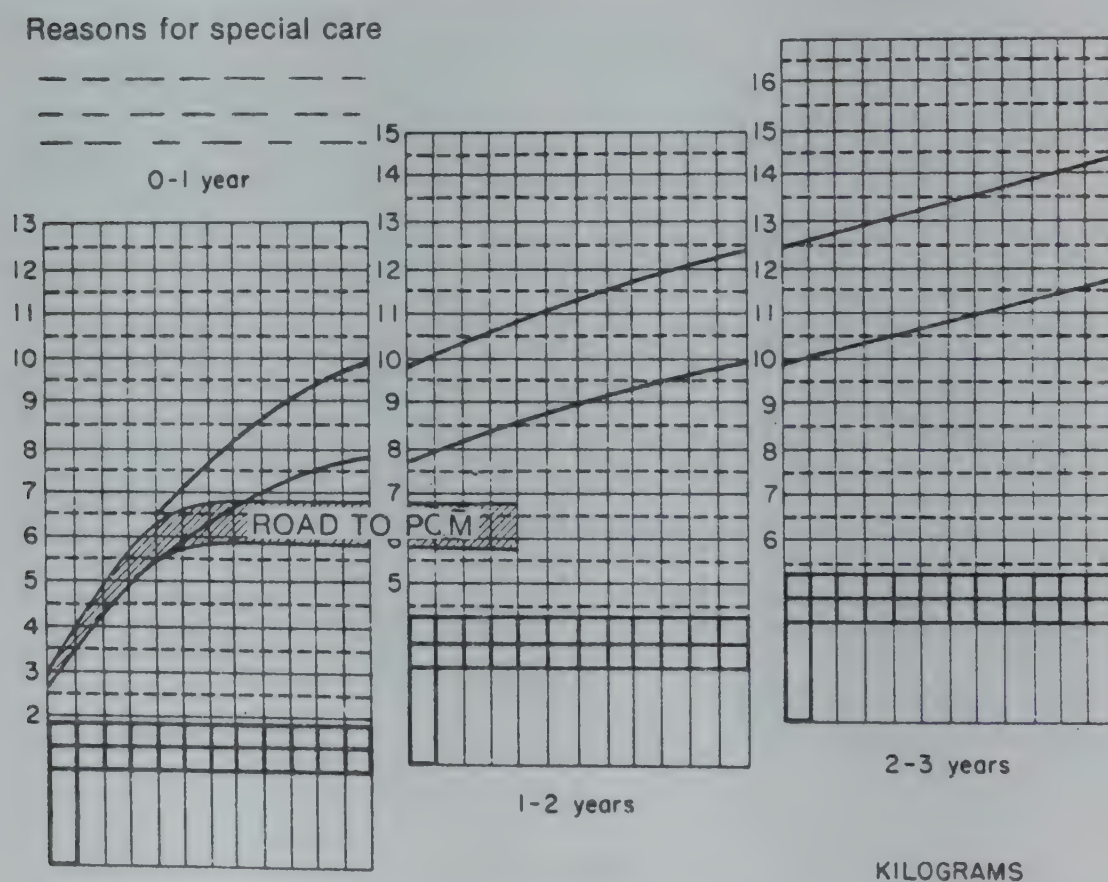


Figure 2.12
Road to PCM

In Figure 2.13 below we can see another kind of growth curve, You will see that Kaki was all the time on the road to health. Then, when her mother was taught how to feed her well, she gained so much weight that she quickly climbed above the top line. Though she was on the road to health, she had been much less than the weight she should have been. Her true healthy-weight curve is the broken line on the graph. She is one of the children whose growth curve is above the healthy-weight-for-age line when they have enough to eat.

Children can become malnourished at any age, but the most common time is in their second year which is the time that Sukhwinder got marasmus in Figure 2.10, and Andrew got kwashiorkor in Figure 2.11.

Reasons for special care

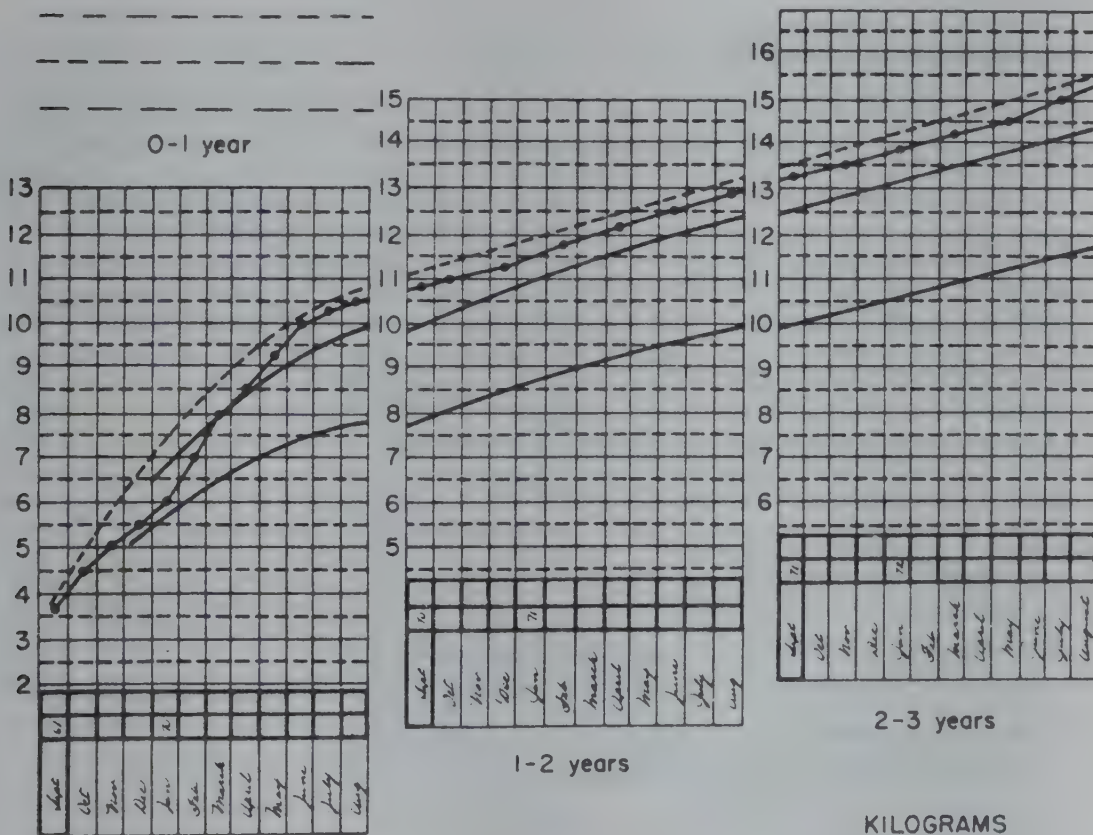


Figure 2.13
Growth Curve of Kaki

Measuring Rehabilitation With The Road-to-Health Card

2.14 In Figure 2.14 below we can see what happens when a child with kwashiorkor, such as Andrew, is well fed and starts growing again. We could say that Andrew was cured, but we usually say that he was “rehabilitated” which means even more than simply “made well again.” Nutrition rehabilitation means making certain that a child is not going to become malnourished again as soon as he goes home to his family. It means improving a child’s nutrition and teaching his mother how to take care of him so that he does not get PCM again. This can be done by taking him and his mother into the hospital so that he can be given good food and she can be taught how to feed him. A child can be rehabilitated in the hospital, but it is cheaper to rehabilitate him in a special rehabilitation unit. Figure 2.14 shows Andrew’s rehabilitation growth curve when he and his mother went to stay in a rehabilitation unit.

Reasons for special care

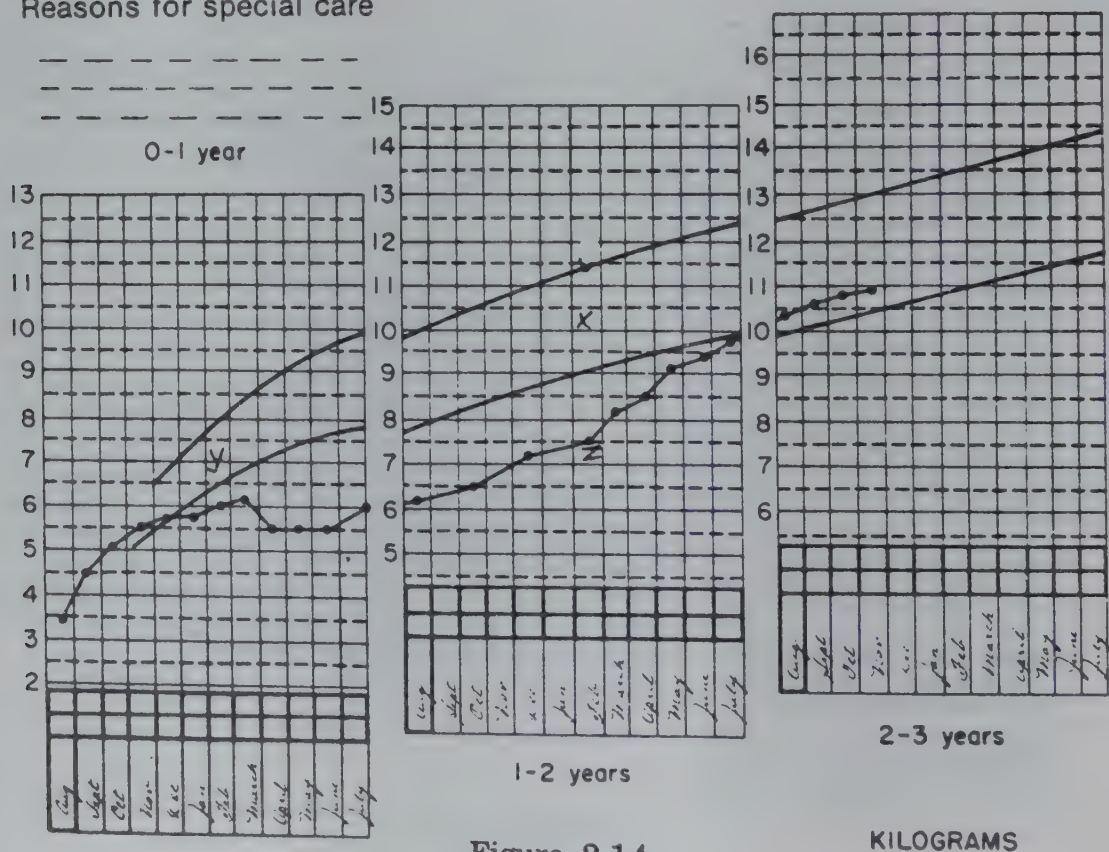


Figure 2.14
Andrew's Rehabilitation Growth Curve

If we are going to be able to measure how good we are at rehabilitating a child and his mother, we must think more carefully about weight and age. As we have seen, Andrew got kwashiorkor when he was 19 months old and weighed $7\frac{1}{2}$ kg. The weight Andrew should be for his age is about 10.5 kg and is marked by point X on the graph (Figure 2.14). A healthy child of $7\frac{1}{2}$ kg would be 8 months old. This is the right age for his weight and is marked by point Y on the graph.

We have seen before that the younger a child is, the quicker he grows. A child grows very quickly at point Y, and the healthy-weight-for-age line goes up quickly. He is growing more slowly at point X, and the line is more flat. If a child is going to be rehabilitated from kwashiorkor and gain again as much as possible of the weight he has lost, he must grow more quickly than a healthy child of the same age, and he must grow more quickly than a healthy child of the same weight. In other words, he must grow more quickly than a child at point Y on the healthy-weight-for-age line.

It is very important to rehabilitate the children well and to be sure they are on the road to health again. For this we need a good way to measure how good the rehabilitation is. The road to health card is very useful to do this. If we maintain a good record of his weight during the rehabilitation period on his road to health card, and compare it with the healthy weight for age line, we shall be able to see how well he is being rehabilitated. If the child grows more quickly than a healthy child of the same weight, we say he is doing very well and will soon be able to grow normally. If a child grows more slowly than a healthy child of the same weight but more quickly than a healthy child of the same age, we can say his rehabilitation is good, but when we see the child is growing more slowly than a child of his own age, his rehabilitation is not very good, and we must pay a great deal of attention to him. The most important thing about rehabilitation of an underweight child is to bring his growth curve back to normal, as quickly as possible. Rehabilitating malnourished children is second in importance only to preventing malnutrition. And it is very important that children are rehabilitated well. Rehabilitation in the clinic is not enough, we must teach the mothers how to take care of him when he goes home. Otherwise, very soon the child becomes malnourished again. Sometimes it is possible to rehabilitate a malnourished child entirely at home, if he is not severely malnourished; the mother is willing to follow your advice; and, if you can teach her well how to take care of the child at home.

THINGS TO DO

1. *Visit a childrens' ward or a nutrition rehabilitation centre.*

Organize a group of five (or at the most ten) students to visit a childrens' ward or a nutrition rehabilitation centre. When making a request to visit, ask to see the medical records of the malnourished children. If the hospital or centre does not give the children weight cards, take your own blank one with you.

Let one of the students read out loud the medical history to the group. Ask the mother or attendant questions about the child. Find out what food the child was given in the months before he came to the hospital. Was he breast-fed? Did he get any extra milk or any other food? At what age did the child get the extra food? How much was he given? Did he have diarrhoea or a cough? Did he have measles or any other illness? Find out if the mother changed the feeding of the child while he was ill. Look carefully at the child for the signs of malnutrition we have been talking about. If the child is not malnourished now and looks more healthy, ask the mother how he looked before.

Use the weight graph, putting down the weights written by the hospital or centre and making a road-to-health card. Read from the card how long the child has been malnourished and how he is coming back to the road to health.

If the child is getting healthier, let the mother know how happy you are that he has been cared for so well. Even if the child is still very ill, let the mother see the weight graph, help her understand what happened to the child, let her know that she is now doing the right thing for her child, and give her hope. Be very kind.

2. *Judge the age and nutrition of children.*

In Section 2.7 you learned how difficult it is to see if a child is well nourished simply by looking at him. One way to see how difficult this is to do is attempt to do it. Five or six children of different ages, some well and some badly nourished, should be seated in a line, every one with his mother or a nurse. Give a number to every child. Students should then in turn look at all the children, one at a time, and write down how old they think the child is and if they think he is well or

badly nourished. They should then meet and ask the doctor what the right answers are. Many people will be wrong. It is difficult to measure the nutrition of a child without knowing his weight for his age. This guessing test can be done at a clinic as well as a rehabilitation centre or childrens' ward.

3. *Attempt to visit a school and measure the heights and weights of the children.*

At least three or four nutrition students at once should work on this, and measure about 100 children in a primary school. Ask the principal if you may measure the heights and weights of the children and if you may copy from the school records the birth dates and class results.

Make one table that has the height for age and another that has the weight for age. Then make tables for all the classes comparing weight with class results and height with class results.

Talk about the results with the other nutrition students and your teacher. Probably you will learn that children of the same age are not all the same weight and height, and that some children of different ages are nearly the same in height and weight. And you will learn that as age goes up so does the most common weight and height for that age.

CHAPTER 3

NUTRIENTS AND PROTEINS

Nutrients

3.1 In Chapter 2 we saw what happens when a child does not get the food he needs. In this chapter and the next one, we will see what foods are made of.

All foods are made of nutrients. There are six kinds of nutrients:

<u>Nutrients</u>	<u>Uses</u>
Proteins	Body-building and repair
Carbohydrates	Energy and warmth
Fats and Oils	
Vitamins	Protection from some diseases
Minerals	
Water	

If adults are to be healthy and children are to grow, they must have enough of all of these nutrients which come from the food they eat. The first nutrient to think about is protein.

Protein is for Growth or Body-building (See Figure 3.1)

3.2 In the same way that a village is made of houses, our bodies are made of many small parts named *cells*. Cells are mostly made of proteins in the same way a house is made of bricks. A child starts as one cell inside his mother's womb and it is so small we cannot see it. This cell takes in protein and builds another cell. Every one of these cells takes in more protein and builds two more cells. This goes on till there are millions of cells which take on different shapes to make the different parts of a child's body, such as his muscles, his eyes, his heart, and his brain. A child in his mother's womb grows from one cell, weighing almost nothing, to a birth weight of 3 kg. Because a child is growing very fast at this time, he needs much protein. This comes to him through the cord (the umbilical cord) that joins him to the placenta at the inside of his mother's womb. A pregnant mother

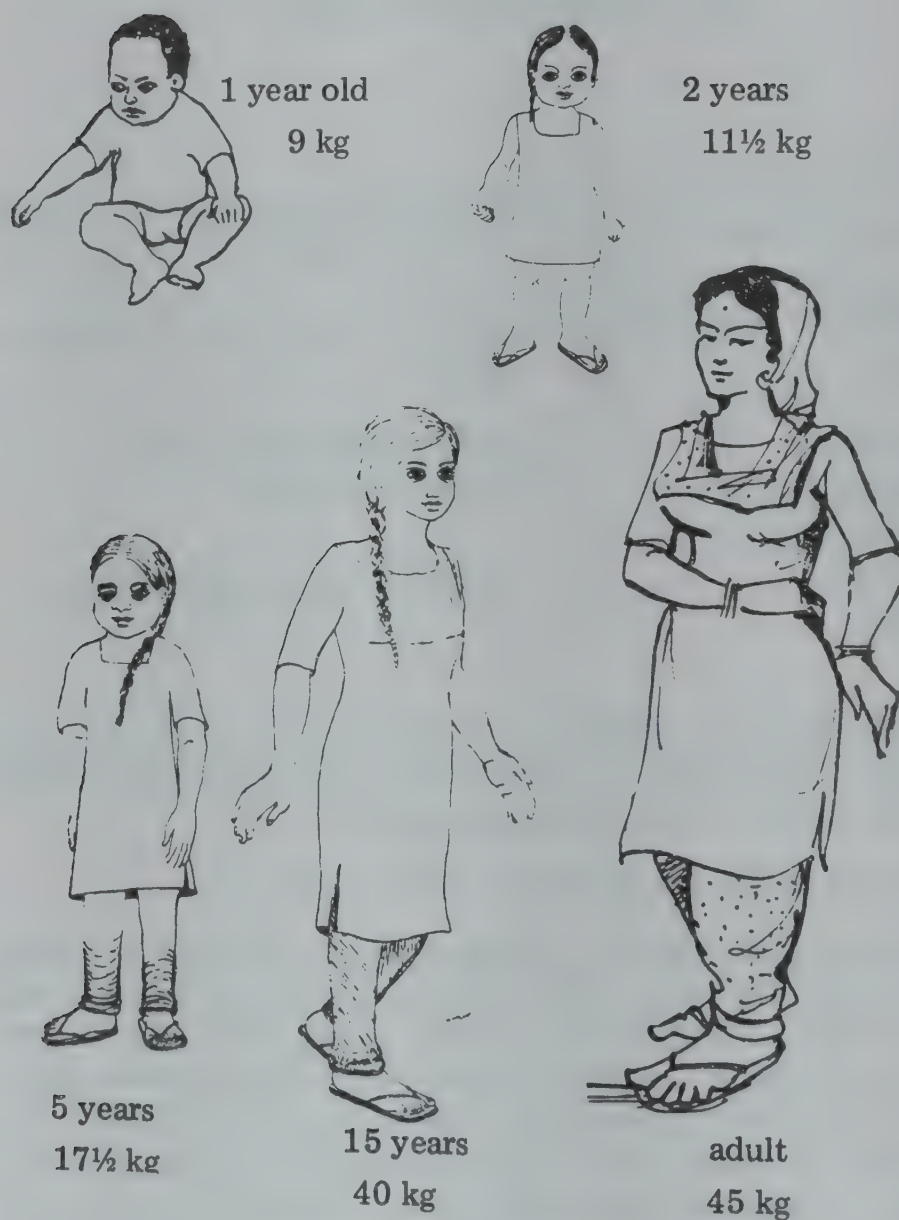


Figure 3.1
Protein Is Necessary For Growth

must eat the right amount of protein if she is to have enough for herself and enough for the child who is growing inside her.

When a child is born, his body and, most important, his brain go on growing. We saw in the first chapter of this book that he grows so fast that he doubles his birth weight in the first six months of his life and triples it in his first year. If a child is to be able to grow as fast as this, he needs enough protein food. In the first months of his life, this protein comes to him in his mother's milk. After the age of 6 months, he must have extra protein foods. After a child is one year old, he grows more slowly, but he is still growing and he still needs much protein food.

Protein for Repair

3.3 When a child becomes an adult, he stops growing; that is, he stops getting taller and he gets only heavier if he gets very fat. We see, then, that an adult does not need protein for growing but does need protein because different parts of his body are getting old and wearing out all the time. Every cell lives for a while and then dies and a new cell has to be made. Every red cell of the blood, for example, lives only for about 120 days, after which it wears out and a new red cell has to be made. Protein is needed to make these new cells, so an adult has to eat protein to repair his body. Because the cells of a child's body are wearing out as well, a child needs protein for repair in addition to protein for growth.

If you wear a pair of shoes for a long time they will get holes; but if you wear no shoes, the soles of your feet will not get holes (see Figure 3.2 below). This is because new skin cells are being made

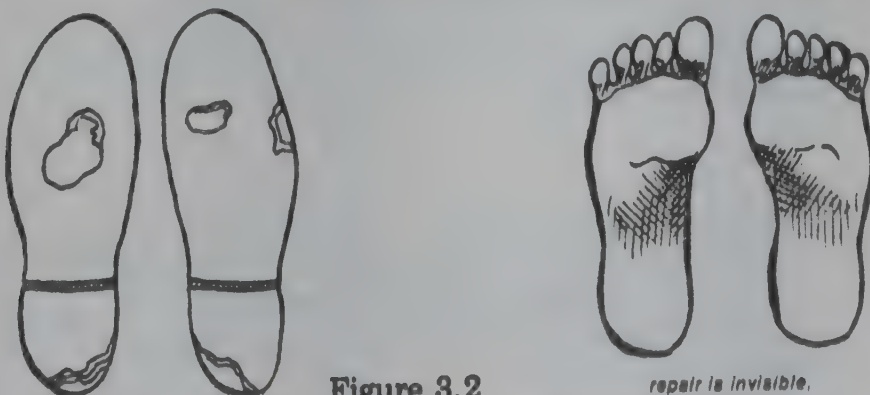


Figure 3.2
Protein Is Needed For Repair

*repair is invisible,
we cannot see it,
but it is happening
all the time*

all the time under the old skin. The hard skin that touches the ground is being rubbed away, but the new skin is growing all the time to repair it. In the same way, after the barber has cut a person's hair it is repaired again. This new hair is made out of protein. In the same way when you cut yourself, the hole in your skin is repaired by new skin cells made out of protein. We can understand repair of the body most easily by thinking about the skin and the hair, but the same thing is happening to all parts of the body all the time.

When the body is harmed by a cut or a burn, some of the skin is cut or burned off, and the harm must be repaired with protein. In much the same way, when the body is harmed by an illness, such as measles, malaria, or tuberculosis (TB), some of the cells inside the body are harmed and wear out faster than usual. This is easy to see in children, who frequently get thin and stop growing when they are ill. People who are ill need extra protein to repair the harm caused by the illness. A child who is ill needs more protein.

We can now make a list of the people who need protein and what they need it for.

People Who Need Protein

- A healthy adult needs protein to repair his body.
- A pregnant woman needs protein for repair and for building the baby who is growing inside her.
- A nursing mother needs protein for repair and to make milk to feed the growing child.
- A child needs protein for repair and for growth.
- A child who is ill needs more protein to repair the harm caused by his illness.

**AN ILL CHILD NEEDS PROTEIN FOR REPAIR
AS WELL AS FOR GROWTH**

Some Foods Have More Protein Than Others, and Some Proteins Are Better For Body-building Than Others

3.4 Now that we know why we need protein, the next thing to think about is the kind of foods that have protein and how good it is for body-building. There are two very important ideas here:

FIRST, nearly all foods are mixtures of nutrients; in some foods there is more protein than in others. Almost no foods are made of one nutrient only and, even though they look dry, most foods have some water in them. Some foods, such as green plants like cabbage, are nearly all water.

A good way to think about how much of the different kinds of nutrients there are in a food is to use "percent." When we use percents in this chapter, we mean the number of grams of a nutrient (such as protein) in 100 grams of a food (such as rice).

A good way to picture these percents is to use a bar graph. This is only a bar like that in Picture A, Figure 3.3, divided into 100 equal parts or "percents." When we want to make a bar graph to show the nutrients in rice, we make Picture B. There are 8 grams of protein in 100 grams of rice. Another way to say this is that rice has 8 percent protein. Because we are going to picture protein in black in our bar graphs, we make the length of 8 percent on our bar graph black. We will picture fat or oil with dots and because there is only 1 percent of oil in rice, we mark the length of 1 percent in dots. Carbohydrate is pictured with thin crossing lines. Rice is mostly carbohydrate — 78 percent — so we mark the length of 78% with thin crossing lines. Water is pictured with thick sloping lines. Even when rice is dry, it is about 10

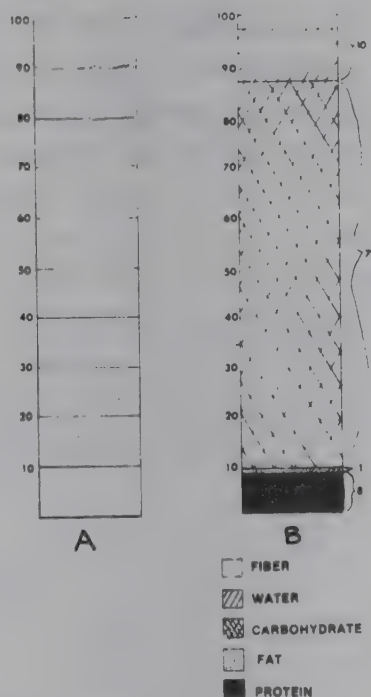


Figure 3.3
The Nutrients of Rice
on a Bar Graph

percent water, so we mark the length of 10% with thick, sloping lines.

The percent of nutrients in a food does not always add up to 100. Our percents for rice only add up to 97% ($8+1+78+10=97$) and 3% is not talked about. In the bar graphs for the other foods, there may be some percents missing. This is because it is not always easy to measure the nutrients in food exactly, and because there are other things in food like fibre which are not nutrients and are not pictured in the bar graph. Fibre is the string-like part of some foods, which the body cannot use.

Even though they are important, vitamins and minerals have not been put in most of the bar graphs because there is so small an amount of them, much less than 1 percent.

MOST FOODS ARE MIXTURES OF NUTRIENTS

Though most foods are mixtures, many of them have much of one nutrient and less of the other nutrients. Frequently, foods are named after the most important nutrient they have. Foods which have mostly fat or carbohydrate and possibly only a small amount of protein are named *energy foods* (see Section 4.1 next chapter). Foods in which the most important nutrients are vitamins or minerals are named *protective foods* (see Section 4.2 next chapter). Some "foods" have almost no nutrients at all except water, so they are named "*non-foods*" (see Section 4.7). Some foods are not mixtures. Cooking oil is all oil, and sugar is all carbohydrate. These foods have no protein at all (see Figure 3.4 below).

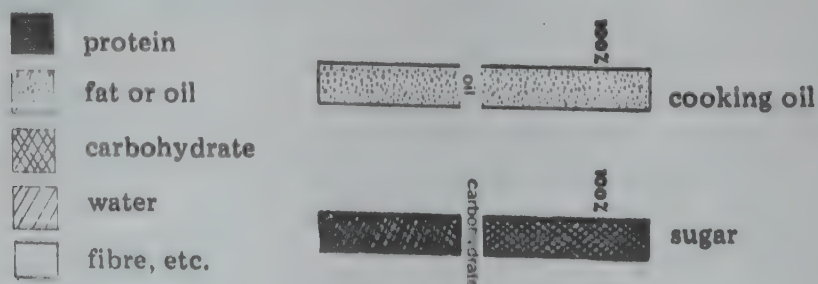


Figure 3.4
Some Foods Are One Nutrient Only

SECOND, some kinds of protein are better than others for body-building. Like our bodies which are made from cells which are in part protein, the bodies of animals and plants are also made of cells. Our bodies are like those of cows and goats, and their proteins are like our proteins. This is called animal protein. Our bodies are not like those of rice or dal. Their proteins are not like our proteins. These are plant proteins. Because it is usually easier to make something out of another thing of the same kind, animal proteins are usually better for building our body than plant proteins. We see, then, that proteins are different as to where they come from and how good they are for body-building. Some are better than others. Later we will talk about how good they are for body-building. We will see that, even though plant proteins are usually not as good for body-building as animal proteins, they can be made quite good by mixing them. We will see that plant proteins are very important because they are cheaper and much easier to grow than animal proteins.

Now you know why one food may have much protein, but it may not be very good for body-building. Or, another food may have only a small amount of protein in it, but this protein may be very good for body-building. *How much protein there is in a food and how good that protein is for body-building are two very different things.*

When you understand these two very important ideas, you can read more about them. The first thing to think about is how much protein there is in different plant and animal foods.

The Plant Foods That Give Us Protein

3.5 Here are Figure 3.5 and Table 3.1 (see next page) which list some plant foods and the protein they have. Those that have the most protein are at the top of the table on the next page.

As we can see in Table 3.1, the family of plants named gram and dal has the most protein. Of these, the soya bean has the largest amount, about 34 percent. Because peanuts have 23 percent, they are a good food for young children. Gram and dals as well as dry beans of other kinds are 20 percent protein and are nearly as good. Next on the list are the good staples, such as wheat, rice, maize and bajra. The staple is the food eaten most in a country. All the good staples are about 8 to 10 percent protein. Palak and Sarson ka sag are very good kinds of dark green leaves and may be as much as 5 percent protein, but most green leaves are only about 3 percent. Protein content of

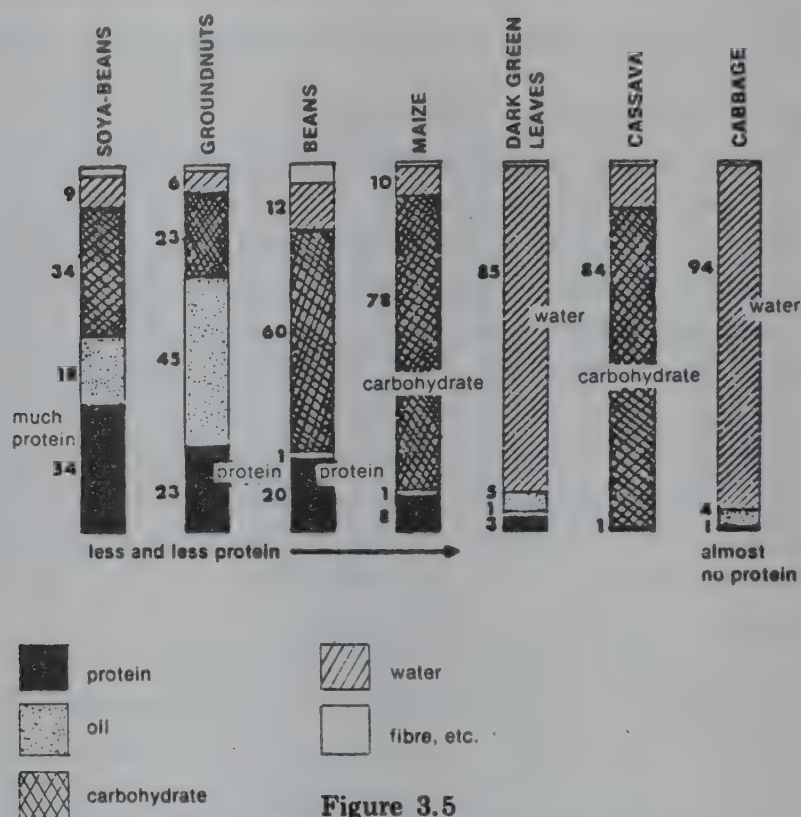


Figure 3.5

The Plant Foods That Give us Protein

Table 3.1

The Percentage of Protein in Some Plant Foods

Legumes

Soya beans	34%	enough protein to be named "protein foods"
Groundnuts	23%	
Grams and Dals	20%	
Dry Beans and Peas	20%	

Good Staples

Wheat, Rice, Maize and the millets	8-10%	protein very useful, but not enough to be protein foods
Dark Green Leaves	3%	
Irish Potatoes		

Poor Staples

Cassava, Sweet Potatoes	1%	not enough protein to be useful
Matoke, Cabbage	1%	

potatoes (alu) is 2%. This is low but since they are cheap, easily digested and do not increase very much in bulk when cooked, and can be eaten in large amounts, potatoes are a good source of nutrients. Also, the farmer needs less land to grow potatoes than to grow cereals. Poor staples like the sweet potato are only 1 percent protein; the same is true of pale green plants like cabbage, which are almost all water.

Grains like wheat, bajra, maize, and rice are sometimes named *cereals*. They are all 8 to 10 percent protein. They are very different from the roots, like cassava and sweet potatoes, which are only 1% protein.

You can see from the table that peanuts are 45 percent oil and 23 percent carbohydrate. This carbohydrate and oil give us much energy. Because they have much energy food, as well as much protein, peanuts are very useful to us.

Do not worry about remembering all these numbers. It is more important to be able to compare one food with another. It is useful to know, for example, that rice has about 8 times as much protein as sweet potato and that there is more protein in soya bean than in ordinary gram.

The Animal Foods That Give Us Protein

3.6 Here is Table 3.2 (below) and Figure 3.6 (next page) which list the animal foods that give us protein.

The list is an easy one to remember because all foods from animals give us protein, except for butter or ghee (which is the fat from milk) and lard (which is the fat from animals). You may be surprised to see mother's milk among the animal proteins. But man is only a special kind of animal, and mother's milk is the most important animal protein food for a baby.

Table 3.2
Animal Protein Foods

Milk, mother's milk and dried skimmed milk
Cheese
Fish of all kinds, whether fresh or dried
Eggs
Meat of all kinds
Blood, liver and all the inside parts of an animal
Chicken

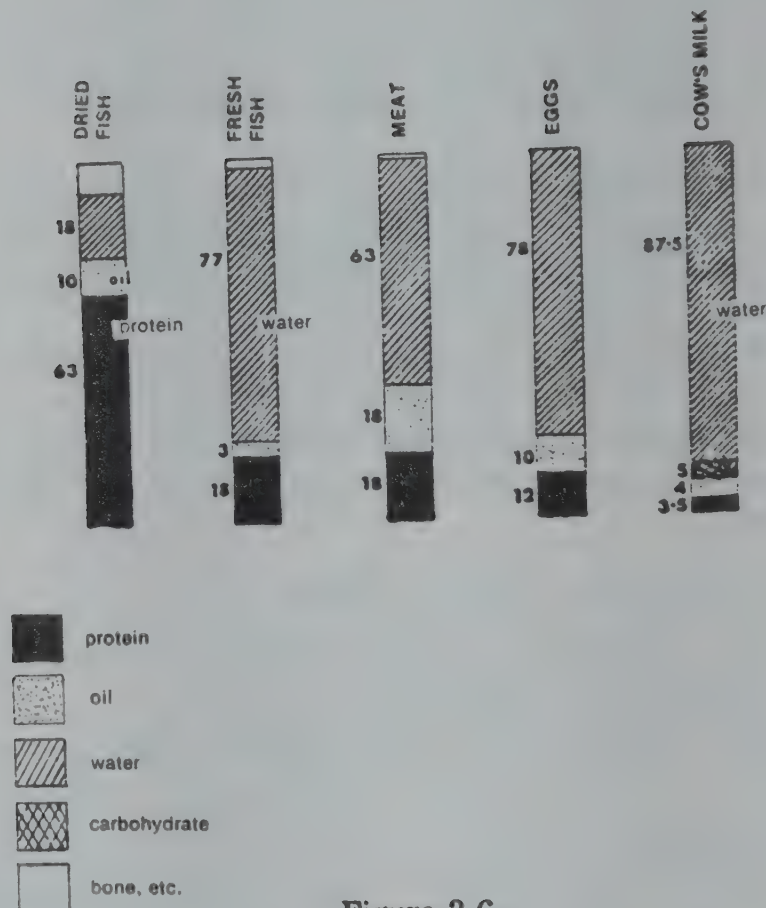


Figure 3.6

The Animal Foods That Give Us Protein

Some animal foods have more protein than others as we can see from Figure 3.6 above.

What Proteins Are Made Of

3.7 So far in this chapter, we have seen that foods are mixtures of nutrients and that one of the most important nutrients is protein. We have seen that protein is needed for building and repairing the body. We have seen that some foods have much protein

and some have only a small amount. We have seen, for example, that there is not much protein in sweet potato (1%), more in maize (8%), and even more in dried dal (24%). We must now think about how good that protein is for body-building; this is very different from how much protein there is in a food. For example, there is only 3.5 percent protein in fresh milk, but milk protein is very good for body-building. There is 34 percent protein in soya beans, but soya bean protein is not as good as milk protein for body-building. In this part of the chapter we will write about how some proteins can be better than others for body-building.

In some places, houses are made of blocks or bricks made of sand or clay. Some clay is good and makes strong blocks. Other clay is bad (if it gets damp) and it makes weak blocks. When we use clay to make blocks, the strength of our blocks depends on how much clay we use (whether we use a large or small amount) and how good our clay is (whether it is strong or weak). It is the same with protein foods. How useful a food is for body-building depends not only on how much protein it has (whether it has a large or small amount) but also how good or useful that protein is for body-building.

What Makes Protein Food Good For Children

3.8 This is a good place to think about the things that make a protein good for feeding children. If a food has much protein, that is, if it has a high percent of protein, it is good for feeding children. If the protein is good for body-building this makes the food a good one. If there is much protein in a small space, this is very good (Section 3.12). If the protein food is cheap and tastes good, this is good. Let us put all these things in Table 3.3 below.

Table 3.3

Things That Make A Protein Food Good For Children

- A high percentage of protein
- The usefulness of the protein for body-building
- Small bulk
- Cheapness
- A good taste

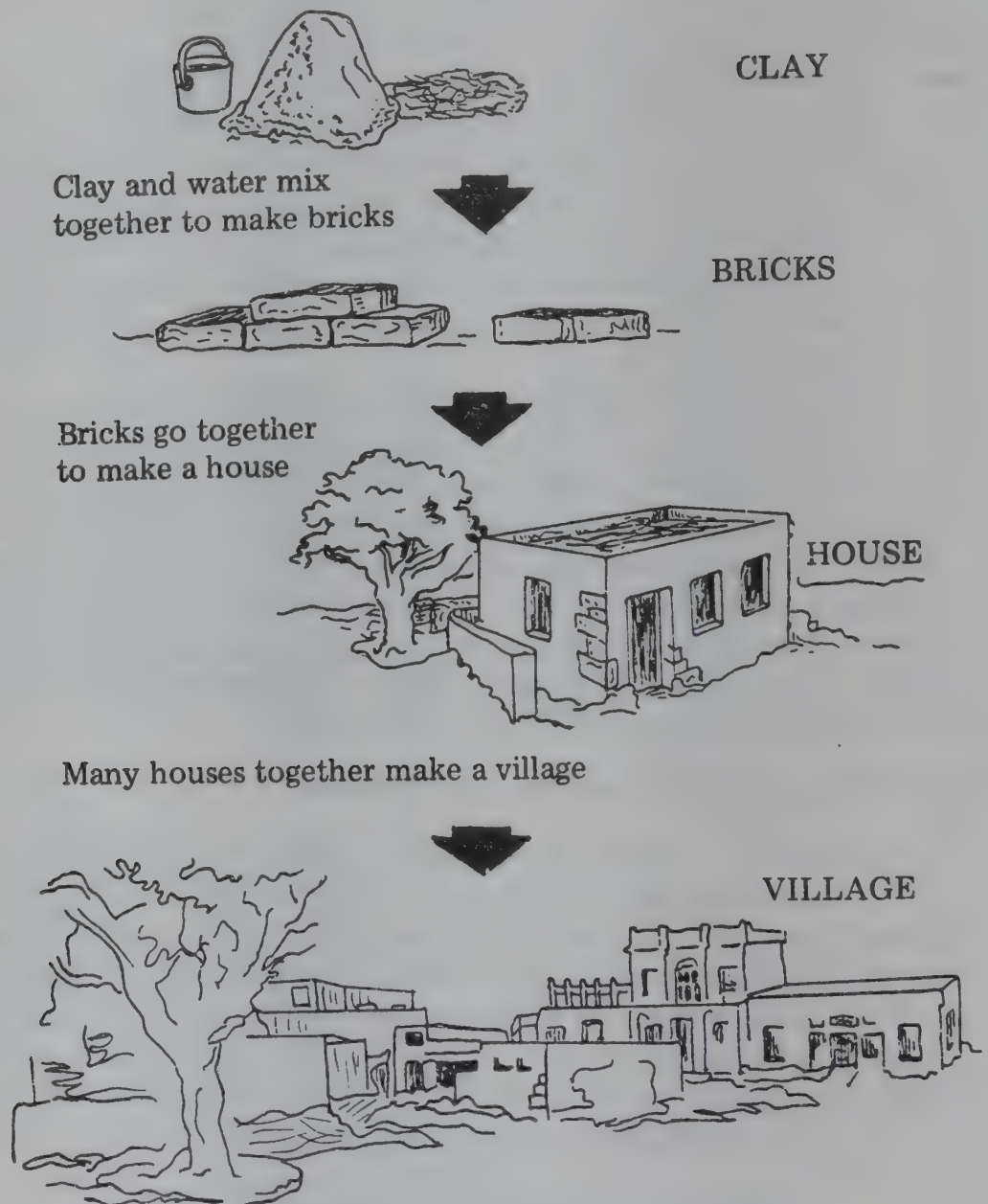


Figure 3.7

Comparing body-building from amino acids, to proteins, to cells, to bodies — with a village made of many houses, built of many bricks, made from clay and water

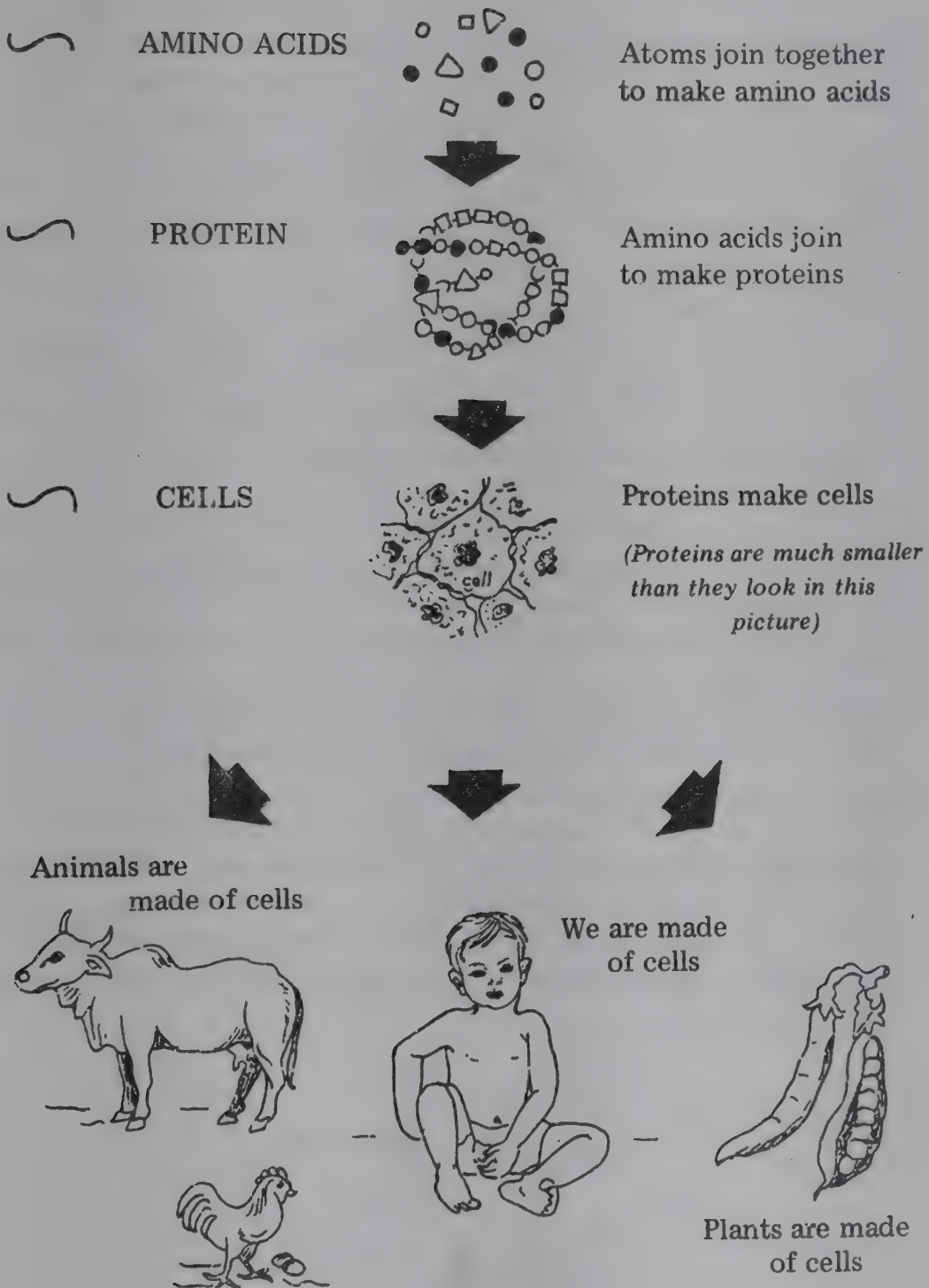


Figure 3.7

You might like to know how some proteins can be better for body-building than other proteins. To understand this you have to know how proteins are made. We shall try to explain this using a very simple idea. You remember earlier we had talked about bricks and clay to build a house. We shall use the same example again. We thought of our bodies being made of cells in the same way that a village is made of houses. The cells of the body are made of proteins in the same way that a house is made of bricks. These proteins are made of very small things named amino acids, like bricks are made of clay. As there are different kinds of clay, so there are different types of amino acids. As the quality of different kinds of clay and the amount in which they are used makes a brick strong or brittle (soft, easily broken), so the quality and quantity of different amino acids in a protein molecule makes it different from others. (Figure 3.7)

There are about 20 different kinds of amino acids. The names of two of them are methionine and lysine. About 100 amino acids of different kinds join to make a protein molecule, which is much larger than an amino acid molecule. There are millions of different kinds of protein molecules, depending on the kinds of amino acids they contain.

One other way to think of amino acids is to think of them as beads (Figure 3.8 below). When beads are joined with a thread they make an amino acid chain. When a necklace is rolled it makes a ball. When a long amino acid chain is rolled, it makes a protein. Different colored beads can be joined with thread in many different ways to make many different necklaces. In the same way, different amino acids can be joined in many different ways to make many different proteins. The way in which the amino acids are joined as proteins is what makes a man different from a maize plant, a chicken, or any other living thing.

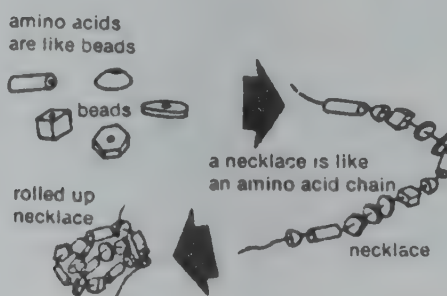


Figure 3.8

Protein is Like

When a man eats a protein food, such as fish, it is broken down or digested inside his gut (stomach and intestines). First the cells in the food are broken down so that the proteins come out of them. Then these protein chains are broken down into separate amino acids. It is as if many different necklaces were broken into separate beads. This breaking down or digesting is done by special things named *enzymes* in the gut. Proteins are quite big, but amino acids are very small. After the amino acids have been separated from one another they can easily be taken into or absorbed by the body through the wall of the gut (see Figure 3.9 below). When amino acids are inside the body, they can be joined in the special order that the body uses to make its own proteins. This joining of amino acids to make the body's own proteins is named *body-building*. The order of amino acids in the body's proteins is different from the order of the amino acids in food proteins. It is as if a necklace (food protein) were broken into beads (digestion) and the beads were put together in a different order to make a different necklace (the body's proteins). As a long necklace has many beads, so a protein has many amino acids, usually several hundred. If the order of the amino acids in a protein is changed, the protein is different. Also if one of the amino acids is changed or replaced by another, that protein is different.

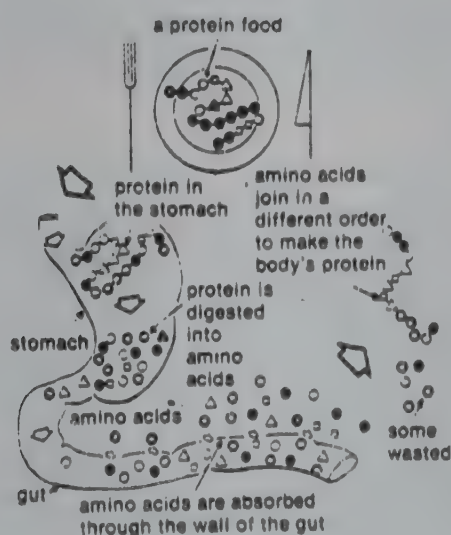


Figure 3.9
Digestion and Absorption

The body can make some amino acids out of other ones, but there are about 8 of them it cannot make. The amino acids that the body can make are named the *non-essential amino acids*. The 8 amino acids that the body cannot make are named the *essential amino acids*. Essential means necessary, or something that somebody must have. These essential amino acids have to be eaten in the food proteins. Lysine and methionine are essential amino acids.

ESSENTIAL AMINO ACIDS CANNOT BE MADE BY THE BODY
--

When the proteins of egg or mother's milk are digested they give us the right proportions of amino acids that we need for making our body proteins. There is no amino acid which is very scarce and there is not too much of any one amino acid. The proteins of egg and mother's milk are perfectly used for body-building. They are the **best** body-building foods. They are 100 percent used for body-building.

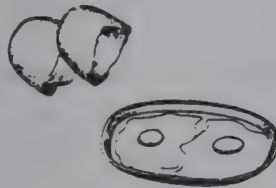
Most other proteins, when they are digested, give us a less perfect mixture of amino acids for body-building. When they are digested, some of it is wasted and they give us a less useful group of amino acids. We have to eat more of these other proteins to get the amino acids we need. In eating these proteins we get many amino acids that we do not need and which we have to burn for energy (Section 4.1). If we do not get the amino acids we need, we cannot make the protein our body needs and we become malnourished.

Reference Proteins

3.9 Some proteins such as egg and mother's milk give exactly what the body wants. Because the proteins of egg and mother's milk are so perfect for body-building, they are sometimes named *reference proteins* (see Figure 3.10 opposite page). A reference protein is a protein which is so good for body-building that other proteins can be compared with it or referred to it. Other proteins, like those in plants such as wheat or peanuts, are made of different amounts of amino acids than proteins in the body. They have extra amounts of some amino acids and not enough of others. Maize and wheat do not have enough of the amino acid *lysine*, but they do have enough of the amino acid *methionine*. Dal and gram have not enough



mother's milk contains
all the amino acids a
young child needs in
exactly the right amount-
it is a perfect or ref-
erence protein



egg contains all the
amino acids a young
child needs in exactly
the right amount.
it is a perfect or
reference protein

Figure 3.10
Reference Proteins

methionine, but enough lysine. They can be used for body-building, but there is much waste.

Frequently, Proteins Help One Another in Body-building

3.10 Frequently, the amino acids that are more than enough in one protein can make up for those that are not enough in another. It is possible to get many of the amino acids that we need by eating a very large amount of wheat or a very large amount of dal. But if wheat and dal are mixed, we can get the amino acids from much less food. This is because the lysine in dal protein can make up for the lysine that is not in wheat protein, and the methionine in wheat protein can make up for the methionine that is not in dal protein. A mixture of wheat flour and dal has more essential amino acids and is a better body-builder than wheat alone or dal alone.

**PLANT PROTEINS ARE BETTER FOR BODY-BUILDING
WHEN THEY ARE MIXED**

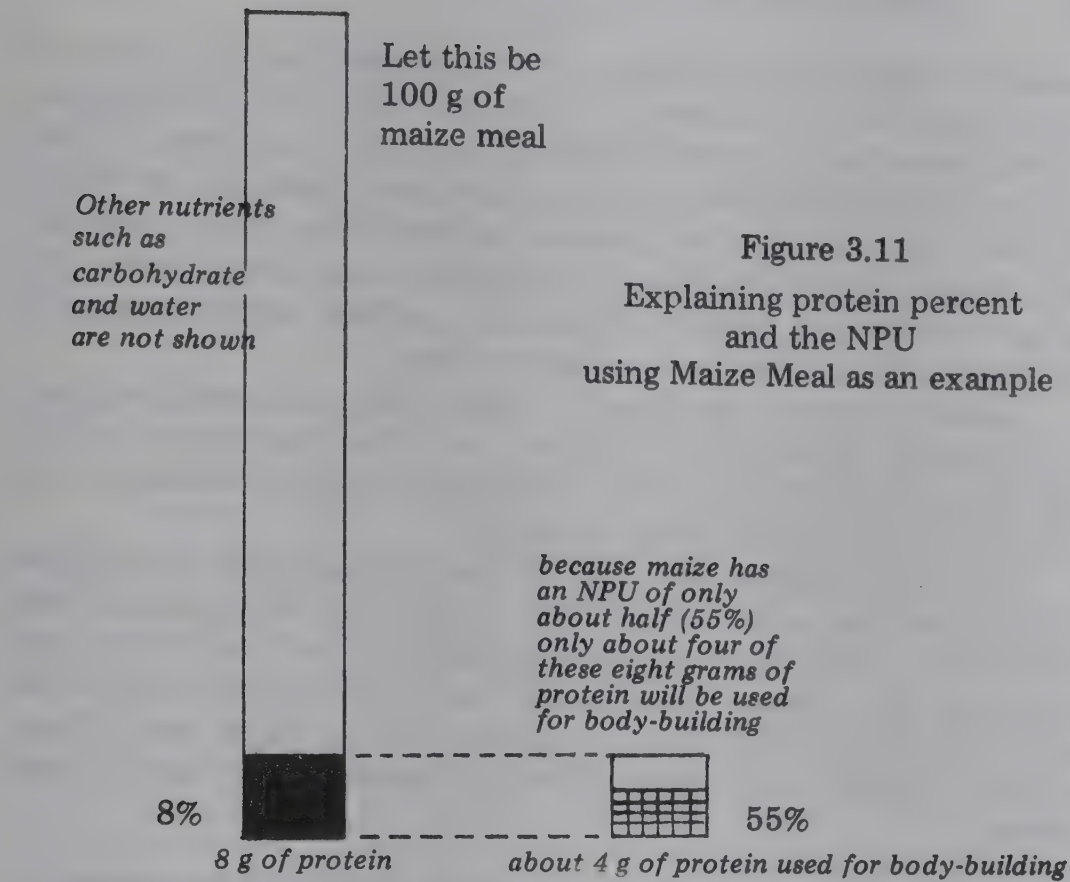
There is much less waste when two plant proteins are eaten mixed (or at the same time) than when they are eaten separately. The best way to make up for amino acids needed in a plant food is to add some animal protein. That proteins can help one another this way, when they are eaten at the same time, is one of the most important things in nutrition, and we will say much more about it later in Sections 5.2 and 7.11 in other chapters. Now you know why it is so important to mix plant proteins.

Some Proteins Are Better Than Others For Body-building

3.11 In Section 3.9 we saw that the proteins of egg and mother's milk have all the amino acids that are needed for body-building in exactly the right amounts. They are named *reference proteins* and can be used for body-building with no waste. In other words, they are used for body-building 100 percent. A special way of saying this is to say that the proteins of egg and mother's milk have a Net Protein Utilization, or NPU, of 100 percent (100%). Utilization means "use." Net means what is left when what is wasted or not used for body-building has been taken out. "Net utilization" means the amount to which proteins are used for body-building, when the amino acids that cannot be used have been burned for energy by the body (Section 4.1). Proteins that are only partly used for body-building have NPU's of less than 100%. Only 55 percent (55%) of maize protein can be used for body-building, for example, which means that it can only be about half used. Maize protein then has a NPU of 55 percent.

**THE NPU MEASURES HOW GOOD A PROTEIN IS
FOR BODY-BUILDING**

You will see that we have used "percent" (%) in two different ways. For example, we say that maize is 8 percent protein, and that the usefulness of this protein for body-building (its NPU) is 55 percent. If you find this difficult to understand, Figure 3.11 on the opposite page may help.



Let the bar graph on the left be 100 g of maize meal. Because maize is 8 percent protein, it will have 8 g of protein which is coloured black at the bottom of the bar. This 8 g is seen again in the bar graph on the right. Because the NPU is only about half (55 percent) only about half of the 8 grams, that is only about 4 grams used for body-building. The 4 g that can be used for body-building have small squares on the graph. From this we see that the percent of protein in a food is one thing. How good that protein is for body-building (its NPU) is quite another thing.

The Difference Between Plant and Animal Proteins

3.12 Amino acids are made by plants, such as rice plants and dal plants and by green plants of all kinds. When goats eat grass they use the amino acids in the grass, mostly the essential ones, to make their own proteins. When we eat goat's meat, we eat the amino acids that have been made by the grass, eaten by the goats, and made into meat. Goats make a small amount of meat from a large

amount of grass and a kilogram of goat protein has more essential amino acids than a kilogram of grass protein. Our stomachs are different from the stomachs of goats and we cannot eat grass. We can get some of the protein we need from other green leaves, but we cannot get it all. We must get the proteins we need from other plants like rice, dals and grams, which have more protein than green leaves. We can get some of our proteins from eating animals or from eating the things that animals make, such as milk and eggs.

Animal proteins, like those in eggs, meat, milk and fish, have more essential amino acids. They are much like those in our bodies, they have high NPU's and they are very good for body-building, even if they are eaten without other proteins.

The plant proteins, like those in rice, dals and grams do not have as many essential amino acids. They are less like the proteins in our own bodies. They are good for body-building if, and only if, they are eaten with one another. Plant proteins are much cheaper than animal protein, and it is usually easier for people to grow plants than to keep animals. Here is a list of the differences between these two kinds of protein.

Table 3.5
The Differences Between Animal and Plant Proteins

<u>Animal Proteins</u>	<u>Plant Proteins</u>
Have more essential amino acids	Do not have as many essential amino acids
High NPU's	Low NPU's
Very much like the proteins in our bodies	Not very like the proteins in our bodies
Very good for body-building, even if eaten alone	Very good for body-building ONLY if eaten together
Not at all cheap	Cheap
It may be difficult for a villagers to keep animals	It is usually easy for a villager to grow plants, such as legumes, which have protein

Plant proteins are important because they can be grown almost anywhere and are cheap. Though the animal proteins like meat, milk and eggs and fish can help good nutrition, they are not cheap and there will not even be enough of them at a cheap enough price to give everyone the protein he needs. Most families will have to get most of the proteins they need from plants, mostly the good staple foods and legumes (see Section 4.4 next chapter).

Legumes and Dark Green Leaves

3.13 Beans, peas, grams, dals, and peanuts are examples of plants named *legumes*. There are many different kinds of legumes, and they have more protein than most other plants. In addition, legumes are useful because they take nitrogen out of the air and keep it in the soil so that other plants can use it. A crop of legumes makes the soil richer in nitrogen than it was before.

The soya bean (Figure 3.12): The soya bean is an important legume because it contains 34% protein. Soya bean has been a source of protein for humans for many, many years. Because of its low cost and high protein content, having many essential amino acids in good proportion, it is one of the cheapest and best sources of protein. Though soya bean grows well in warm countries it has not been widely grown in India before. Now many farmers are being encouraged to grow it. Soya bean can be processed (changed) in many different ways. It can be made into soy flour or soy milk. Soy flour can be mixed with ordinary wheat flour to make roti or chapaties. Curds and panir can be made from soy milk. Thus a mother can give her family more protein without spending too much money. One important way to help families to eat enough protein would be to encourage them to grow soy bean and teach them how to use soy flour or soy milk in daily foods.

Dark Green Leaves. Though eating legumes is the best way of eating plant protein, dark green leaves are very important in addition. They are found everywhere in the bush, and some of them are even found at the end of the dry season. They are at all times ready to use and they are very important as a way of getting some plant protein or getting a different kind of plant protein to make a mixture. If a mother has no protein or only very small amounts, teach her to get large amounts of leaves. It is difficult for an adult to get all the protein

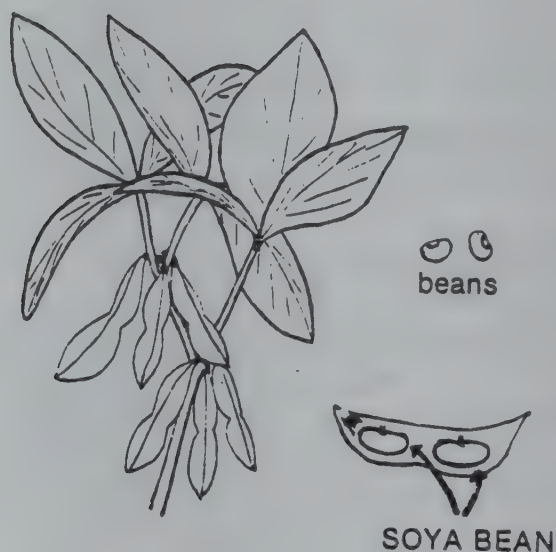


Figure 3.12
The Soya Bean

he needs from eating leaves, and a child certainly cannot. When people do not have enough food, we should teach the mother to give her children the best protein foods she has, such as beans, and cook dark green leaves for the adults. This will give them some protein when there is no other food available.

THINGS TO DO

One of the best ways of teaching about proteins is to use a necklace or string of beads. The easiest beads to use are the ones that children play with, the ones which fit into one another without the need for a string to join them. By using beads like this you can learn about the way amino acids make a chain, about the way the chain rolls up to make a protein, about the importance of the order of the amino acids in a protein, about the different proportions (amounts) of different amino acids in different proteins, about reference proteins, and about how two proteins can help one another in body-building. If you have no beads, use bottle tops with a hole in them, small rolls of coloured paper, buttons, or something like any of them. The best way of all is to use the people in the class as amino acids, and to get them

to make an amino acid chain by holding hands to make a line. They can then make a protein by all coming into a small group. Their protein can be "digested" by letting go of their hands, and they can "body build" a new protein by joining up again in a different order. The class will not forget this kind of lesson. This, by the way, is an idea for teaching students in a class, not mothers in a clinic.

ENERGY FOODS, PROTECTIVE FOODS, WATER AND NON-FOODS

Energy Foods

Energy

4.1 A tractor or a car needs diesel or petrol to run and do work. When the tractor is running, this diesel is burned and used up. We can say that diesel is an “energy food” for the tractor. In the same way your body needs energy foods if it is going to move and work. But you are different from a tractor because when a tractor’s engine is turned off, it does not use any more diesel, but your body uses energy from food at all times. For example, while you are sleeping, your heart keeps working and you have to keep breathing. This uses up some energy. When you move and walk around, you use more energy. If you run fast or do hard work, like digging or carrying a heavy load, you use up still more energy, so you need large amounts of energy for heavy work (see Figure 4.1 below).

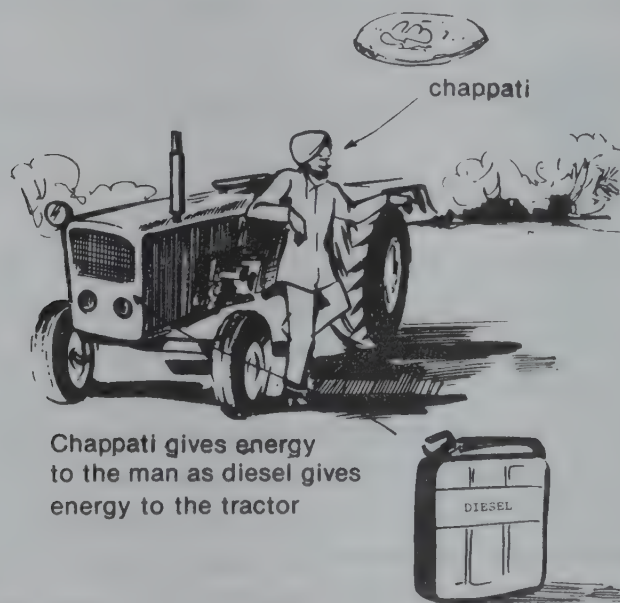


Figure 4.1
Energy Foods for a Man and His Tractor

As a tractor needs diesel to give it the energy to run, so your body needs energy foods. There are two kinds of energy foods — carbohydrates and fats or oils. Most carbohydrates are the white, powdery foods like sugar and flour. For example, a man digging can use the energy of the carbohydrate in wheat or maize or rice to give him the energy that he needs to dig. It may surprise you to think that the body can “burn” food to make heat and energy. In fact it is burning, but it goes on so slowly that there is no smoke or flame, and your body becomes only warm. A tractor burning diesel gets hot when it runs, and in the same way you keep warm by burning energy foods. Your body is less warm at night when you are sleeping and is more warm when you are awake and working hard.

In Chapter 3 we saw that cells make our bodies as houses make a village, and that proteins make cells as bricks make a house. As one must work hard and use energy to lift bricks and make a house, so your body must use energy to make cells out of protein. A child needs much energy food for growing, for making new cells (see Figure 4.2 opposite). Protein food gives us the proteins from which our cells are built (see Figure 4.3, over), while energy foods give us the energy to do the building. A pregnant mother needs energy to put into the milk to give the child at her breast. Children of all ages need the energy with which to grow, to run and play and to walk to school.

CHILDREN NEED ENERGY FOOD FOR GROWING

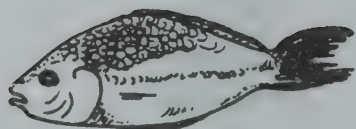
Calories

4.2 Sometimes we want to measure energy. We may want to measure how much energy a man needs to do a certain amount of work or to run a distance. We may want to measure how much energy is in the food that he eats. We use *calories* to measure energy in the same way that we use grams to measure how much something weighs and meters to measure how long something is. The *calorie* is said to be the *unit of energy* in the same way that the gram is the unit of weight and the meter the unit of length or distance.

The new way of measuring energy is to use *joules* instead of *calories*. In India, we are still using calories to measure energy, but in many countries the energy is measured in joules now. So that you can



Figure 4.2
ENERGY FOODS



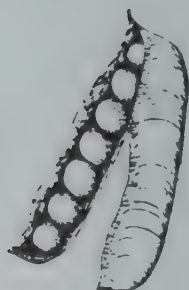
FISH



GROUNDNUTS



MILK



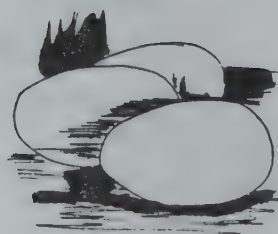
PEAS

PULSE OR
GRAM

MEAT



CHICKEN



EGGS

Figure 4.3
PROTEIN FOODS

readily understand a new text book or some one using joules, we shall explain how joules and calories compare with each other.

The calorie we talked about before is the "big calorie" which is written as "kilocalories," "kcal," or "cal." The joule is a very small unit. We have to use many of them to measure the things that we want to measure. Since it is a very small unit, a man needs about 10,000,000 joules or 10 million joules of energy in a day. It takes a long time to write so many 000's so we must use a shorter and easier way of writing. For thousands (000), we write "kilo" or "k." Kilo means a thousand. For writing millions (ooo,000), we write "mega" or "M." Mega means a million, which is a very big number.

Joule is written as "J." So 10,000,000 joules is written in a shorter way as 10,000 kilojoules or 10,000 KJ. This number of joules can be made even shorter by writing 10 megajoules or 10 MJ.

Now if you look carefully at the table below, you will be able to understand how the big calorie or Kcal and Kilojoule or KJ compare with each other.

$$\begin{array}{rcl} 1 \text{ Kcal} & = & 4.184 \text{ KJ} \\ 1000 \text{ Kcal} & = & 4184 \text{ KJ} \end{array}$$

or, if you look at it another way —

$$\begin{array}{rcl} 1 \text{ KJ} & = & 0.239 \text{ Kcal} \\ 1000 \text{ KJ or } 1 \text{ MJ} & = & 239 \text{ Kcal} \end{array}$$

Now you see if you need to convert Kcal into KJ all you have to do is to multiply the Kcal value by 4.183 or approximately 4. Another way of saying this will be to say 1 Kcal is equal to about 4 KJ.

Let us take an example: A man needs 2500 Kcals of energy in a day. This is equal to about $4 \times 2,500$ kilojoules which is 10,000 Kilojoules or 10 megajoules. More exactly, it is $4.18 \times 2,500$ calories, which is 10.46 megajoules.

For another example, let us take a chappati. It has 124 Kcal as energy, which will be equal to $124 \times 4.18 \text{ KJ} = 496 \text{ KJ}$. On the other hand, if you want to change KJ into Kcal you have to divide the number of KJ by 4.18 or approximately 4.

We shall use Kcal as the unit of energy in this manual, but will give you the energy values in KJ's side-by-side so you can get used to the relationship of KJ's to Kcal's.

Now that you understand the difference between joules and calories and can readily change one to the other, let us go back to our energy food.

Energy Foods

4.3 We have seen in other chapters that most foods are mixtures of nutrients and that some foods have more protein than others. In the same way, some foods have more carbohydrate or fat than others. Because most foods are mixtures of nutrients, many of them such as wheat, maize or rice have protein and carbohydrate. We name some foods "energy foods" because they have more carbohydrate or fat than other nutrients, and have more Kcals of energy. In Table 4.1 opposite, you will see a list of these energy foods and the number of Kcals and joules that are in 100 g (grams) of every one of them. One hundred grams of wheat flour (atta) is about two large handfuls. You may have read in Section 3.9 that when amino acids from the protein that we eat are not used for body-building they can be burned for energy. In Table 4.1 we can see the energy that we can get by burning for energy all of the nutrients — carbohydrates, fat, and proteins — in a food. A gram of fat gives 9 Kcals or 37 kilojoules (37 KJ) of energy, and a gram of protein or a gram of carbohydrate gives about 4 Kcals or 16 kilojoules (16 KJ) of energy. You should not think of proteins as energy foods. They are burned for energy only if you eat more of them than are needed for body-building or if you do not eat energy food at the same time.

You see that some foods have many more Kcals of energy than other foods. In some foods, such as cabbage, there is such a small amount of energy that they are not in the list. One hundred grams of cabbage has only about 17 Kcals or 71 kilojoules (71 KJ). There are 358 Kcals or 1,500 KJ in 100 g of wheat flour. A man can easily get the energy he needs from maize or wheat chappati, but he will get only a very small amount from cabbage.

Oils and fats such as dalda and ghee have much energy, but they are not cheap and not many families have enough money to get many of the calories they need from oils and fats. Oils and fats are useful

for cooking and for adding more calories of energy to foods. Later we discuss how useful it is to add some calorie-giving dalda or ghee to a child's dahlia, suji or khir.

ADD DALDA OR GHEE TO A CHILD'S DAHLIA, SUJI OR KHIR

Table 4.1
ENERGY FOODS

<i>Food</i>	<i>Calories or Kcals /100 gm</i>	<i>K Joules in 100 gm</i>
<u><i>Oils and Fats</i></u>		
Coconut oil, palm oil, groundnut oil	883	3695
Lard, cooking fat, fat from animals	846	3540
Ghee, butter	720	3010
<u><i>Carbohydrates</i></u>		
Sugar	387	1618
Wheat flour from which bread and biscuits are made	364	1522
Maize and rice	360	1505
Honey	289	1212
Sweet potatoes	97	405
Bananas, plantains	75	314
"Irish" potatoes	70	293

Carbohydrates and fats give energy. They cannot be used for body-building because they have no amino acids. For example, if a child is given mostly a pure carbohydrate food, like tea with sugar and a very small amount of milk, he will not grow. This is because the sugar will only give him the energy to run and play. Because the tea has only a very small amount of protein (from the milk), it cannot build and repair his body.

Staple Foods

4.4 The important carbohydrate food of a place is named the *staple*. Many people get their energy food and most of the protein they need from their staple.

Good staple foods such as rice, wheat, maize and bajra are about 8 percent protein and are much better than staples such as ordinary cassava or sweet potato, which are only 1 percent protein. A person who has only low protein staples.

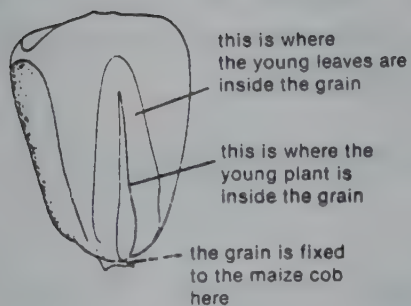
Wheat, rice, and maize can be made into a meal in several ways. When the whole grain of these cereals is used, such as in whole wheat flour (atta), brown rice, or maize chappati, no protein of the grain is lost.

Sometimes the germ (the part of the grain from which the plant starts growing) and the bran (the outer part of the grain) are taken away, such as in white flour (maida) or polished rice (see Figure 4.4 opposite). There is much protein in the germ and the bran part of the grain; so, when these parts are taken away, a large amount of the protein is lost. You can see that the polished rice and the white flour (maida) which cost more money has less food value than unpolished rice and whole wheat flour. These are cheaper but better foods. Poor families can get better nourishment by buying cheaper unpolished rice and flour from whole grain.

WHEAT, RICE AND MAIZE ARE GOOD FOOD FOR CHILDREN

**THE WHOLE GRAIN OF THESE CEREALS
GIVE THEM CALORIES AND PROTEINS**

OUTSIDE



CUT IN HALF

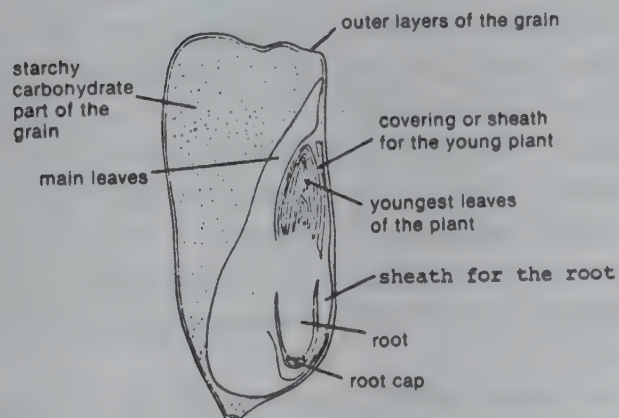


Figure 4.4
A MAIZE GRAIN

Protective Foods — Vitamins and Minerals

Vitamins and minerals are protective foods. We have said that a house is made of bricks, and that in the same way, our bodies are made of cells which are mostly made from proteins. When we build a house, we need other things in addition to bricks and we need the energy to do the building. We need nails and a lock to keep the door shut. A lock may not seem to be an important part of the house, but it is needed to protect the house and keep it safe. In the same way, the body needs some special things if it is to work properly and stay healthy. These are the *vitamins* and *minerals*. The body can make most of the things it needs from energy foods and the amino acids in protein, but it cannot make vitamins or minerals. Only very small amounts of these (only a very small number of milligrams) need to be eaten every day to keep the body healthy.

VITAMINS ARE NEEDED ONLY IN VERY SMALL AMOUNTS

Vitamins are made mostly by plants. They are named with letters such as A, B, C, D and so on. Minerals are found in the ground. Plants get minerals from the ground through their roots. Animals get most of their minerals from eating plants. People get their minerals from eating plants or animals. Iron is a mineral that helps to make the blood red. Calcium is a mineral that helps to make bones hard. The foods which have plenty of vitamins or minerals are named *protective foods* (see Figure 4.5 opposite). If people do not eat enough of them, they get diseases. Not having different vitamins or minerals causes different diseases. People are protected from a disease by eating enough of the right vitamin or mineral. (Protection means keeping safe). When you talk to mothers, talk about protective foods; do not talk about vitamins or minerals because mothers will not find it easy to understand.

As we have seen before, most foods are mixtures of nutrients. Many of them have vitamins and minerals as well as protein and energy food. Because of this, a child who does not have enough calories or protein usually does not have enough vitamins or minerals. If he can be given the calories and protein he needs, he will usually get the vitamins and minerals he needs at the same time. Sometimes, though,

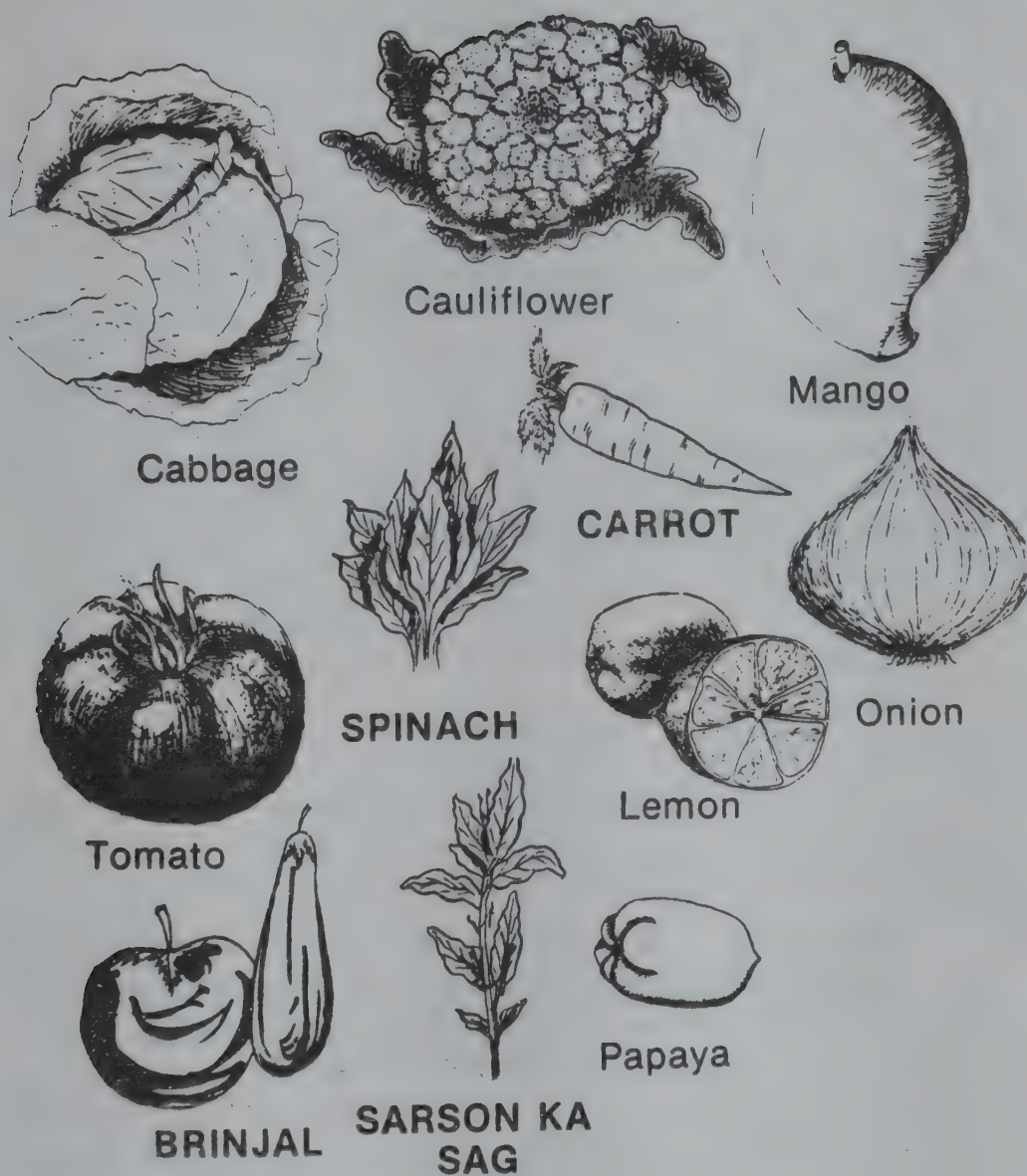


Figure 4.5
PROTECTIVE FOODS

the body may still not have enough iron and iodine, even though it is getting enough protein and calories.

*A CHILD WHO IS GETTING ENOUGH CALORIES AND PROTEIN
USUALLY GETS ENOUGH PROTECTIVE FOOD*

Table 4.2
PROTECTIVE FOODS

Pumpkins	Mangoes
Pumpkin leaves	Papaya
Sweet potato, and	Oranges
Sweet potato leaves	Limes
Other green leaves from the bush	Lemons
Tomatoes	Guavas
Peppers	Pineapples
Carrots	
Onions	

Vitamins

4.5 Vitamin A. If a person's eyes and skin are going to stay healthy, there must be some vitamin A in his food. There is vitamin A in many orange or yellow fruits and vegetables, such as mangoes, papaya, ripe tomatoes, and carrots, bers or jamun, and there is vitamin A in dark green leaves, such as palak and sag. Vitamin A can be found in the liver of animals. If there is not enough vitamin A in someone's food, he is not able to see in the dark. If he has very little or no vitamin A, the eyes become dry and finally the clear, front part (cornea) of his eyes will be harmed and he may become blind.

As with other vitamins, a very small amount of vitamin A is enough to keep a person healthy and seeing well. Some fat in the food helps vitamin A to be absorbed from the gut. It is useful that

the body can keep extra vitamin A in the liver because children can eat enough green leaves and yellow fruits in the season when they are common to give them extra vitamin A that lasts for many months.

BECAUSE CHILDREN NEED VITAMIN A
WE SHOULD GIVE THEM MANGOES, PAPAYA
AND GREEN VETETABLES TO EAT

4.6 Nicotinic Acid or Niacin (one of the B group of vitamins)

This is another important vitamin which is found in ground-nuts (moongphali) as well as in grams, dals and whole wheat. If a person does not have nicotinic acid in his food he will get a disease named *pellegra*. *Pellegra* is common in some districts. It is seen in people who eat only maize without enough other foods to give them the nicotinic acid they need. It is common in adults who drink a lot of beer and do not eat enough food. People with *pellegra* have diarrhea and a special kind of skin disease when the skin of the arms and neck gets dark and may come off. They may even become insane. Giving nicotinic acid soon cures these people.

4.7 Folic Acid. Folic acid is one of the B group of vitamins.

The body needs folic acid to make blood. It is found in dark green leaves, like palak and sarson ka sag. Women, mostly pregnant mothers and women who have had a baby, frequently do not have enough folic acid and may get anaemic because of this. A person who is anaemic has thin, pale blood.

PREGNANT WOMEN NEED A LARGE AMOUNT
OF DARK GREEN LEAFY VEGETABLES

4.8 Vitamin C. This vitamin is found in green vegetables and in many fruits.

There is much vitamin C in palak, sarsan ka sag, tomatoes, papaya, bitter gourd, and sweet lemons, bers or jamun. Gourds (kadu) do give some amount of vitamin C. If someone does not have enough vitamin C in his food, he gets a disease named *scurvy*. If a person has *scurvy*, his small blood vessels (capillaries) become weak and break easily. His gums (the parts of his mouth which hold his teeth) swell up and bleed. *Scurvy* is sometimes seen in old people who

do not eat any vegetables or fruits with their chappatis. It is seen in workers who are not married, who cook for themselves and who do not eat any protective foods. Scurvy is seen in children in the dry season, when their mothers cannot find enough green leaves to give them. It is common where there is not enough rain and not many green plants or fruits can be grown to be eaten.

4.9 Vitamin D. This vitamin is found in eggs, milk, butter, and in large amounts in the livers of fish. In addition, it is made in the skin when sunlight falls on it. This is the way that people in our country get most of the vitamin D that they need. Lack of vitamin D causes the bones to become thicker at their ends and to become soft, so that they bend. In children, lack of vitamin D causes a disease named *rickets*. In most villages children run and play in the sun and get the vitamin D they need from the sunlight falling on their skins. But in the towns with tall buildings and narrow streets, not much sunlight gets to the children and they easily get rickets; if they have many clothes on and do not get much vitamin D in their food, they get rickets even more easily.

Minerals

4.10 Salt. Salt is a mineral made of sodium and chlorine. Even the poorest people attempt to buy some salt. People add salt to food because it makes food taste better, but there is usually enough salt in most foods to give the body all it needs, except in very hot weather. In hot weather we sweat more and because there is salt in our sweat, our bodies lose salt and need extra to replace it. There is salt in lassi. In hot weather we should drink lassi or water with lemon and a small amount of salt.

4.11 Iron. This is a mineral the body needs to make blood. There is iron in dark green leafy vegetables, grams and dals, cereals and meat. If there is not enough iron in the food, the body cannot make enough blood, and so the blood becomes thin and weak; we say the blood is anaemic and that the person has anaemia.

A woman needs more iron than a man. This is because there is iron in blood and every month a woman loses some blood in her period. A pregnant mother needs more iron because she and the child in her

womb share it. Many women do not get enough iron and become anaemic.

4.12 Iodine. This mineral is found in very small amounts in water and in some foods. If someone does not have enough iodine, his thyroid may get big (swell) in his neck and he may get a named a *goitre*. In some areas there are such small amounts of iodine in the ground that only very small amounts can get into the food. One way of preventing goitres, in districts where there is not much iodine in the ground, is to add some iodine to the salt that is sold. "Iodized salt" can help to prevent goitres in districts where they are common. (see Figure 4.6)



Figure 4.6

The Goitre

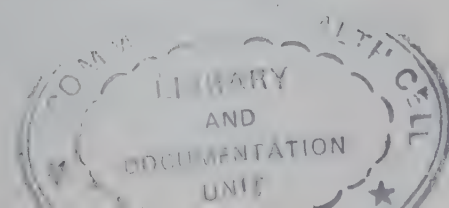
4.13 Calcium. This mineral is needed by the body to make bones. A pregnant or nursing mother needs calcium to make her child's bones. Many foods like raji, milk, dals, bajra and wheat have calcium in them. Some rocks have calcium and some of it may get into water, such as well-water, which has come through the ground. There is usually enough calcium in the food so that disease caused by lack of calcium is not common.

4.14 Fluoride. This mineral is found in water and

helps to build strong teeth. When there is no fluoride in the water in a district, many people get *caries* (holes in their teeth). When there is a small amount of fluoride in the water (about one part of fluoride in a million parts of water), a person's teeth will be stronger and not have as many holes. More than enough fluoride in the water will cause brown patches in the teeth.

Minerals and vitamins are the most important nutrients in many

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fruits and vegetables. Because of this, these foods are named *protective foods*.

The important mineral in green leaves is iron. The important vitamins in green leaves are vitamin A and folic acid (vitamin B). Both iron and folic acid are much needed by pregnant mothers, and these women should eat large amounts of green leaves.

EVERYONE SHOULD EAT SOME PROTECTIVE FOOD EVERY DAY

Most people think of vegetables as a way of eating minerals and vitamins, but as you have read (Section 3.14), there is some protein in vegetables, mostly in dark green leaves. Dark green leaves are 5 percent protein; pale vegetables are only 1 percent. Dark green leafy vegetables are useful for providing both minerals and vitamins and a small amount of protein. By dark green leafy vegetables, we mean palak and sarson ka sag; we do not mean cabbage which is pale. When thinking about protective foods, a good rule to remember is that the darker the leaves and vegetables, the more vitamins, minerals and proteins they will have.

Some foods, such as onions, peppers, and chilies make food taste good so that people want to eat more of them. They are important because they help people to eat more of other foods which have more vitamins or proteins.

Water

4.15 Water is a nutrient, as well as being needed for cooking and washing, and in the fields and factories. In hot weather when the body sweats, a person may lose in one day up to 10 liters of water, as well as some salt. A person will die if he does not have water; if he does not have good, clean water, he will become sick. Food and water are the most important needs of any family. One of the most important and valuable things a person can have is large amounts of clean, safe water. In many families like those in the hills, a mother may have to walk many miles every day carrying water.

Non-Foods: "Fizzy Drinks," Tea, and Coffee

4.16 Many families pay much money for "fizzy drinks" (sodas, cola drinks, lemonades) which have nothing in them but water, gas and a very small amount of sugar or salt. Without the sugar or salt and water, they have no nutrients at all.

Fizzy drinks help to cause caries or holes in the teeth. This is one reason why the teeth of many town children are not as healthy as the teeth of their fathers who did not have these drinks when they were young and lived in the villages.

THERE ARE ALMOST NO NUTRIENTS IN FIZZY DRINKS

These drinks are advertised in the newspapers, magazines, and cinemas. Many people think that they are buying useful food when they buy a bottle of one of these drinks. A child is sometimes given a bottle of fizzy drink for his meal when he should be given some energy and body-building foods. This is sad. People pay more money for fizzy drinks than they do for milk, which is a very good food. This is why we have named them non-foods. "Non" means no or not. They are not foods!

Tea and coffee are two more drinks that have no nutrient of any kind, but the milk or sugar that are added to them. We do not have to pay much money for them but they are not foods.

FIZZY DRINKS, TEA OR COFFEE ARE NOT FOOD

Sometimes a mother will think it is good to give her small child (8 months to 2 years old) a drink of tea or coffee in place of pure milk or other body-building food. When a child drinks tea or coffee, he is getting only warm water with or without sugar and with only a small amount of milk protein. When the tea fills the stomach, the child stops feeling hungry and stops crying, but he will become very mal-nourished. Tea and coffee cannot be used to feed a child. Fizzy drinks, tea or coffee may stop the child crying but will not help him to grow. Spending money to buy these would be a waste.

(Tea and coffee can be used in place of water, if necessary. They will probably not have any harmful micro-organisms (germs) because boiling kills the germs.)

Food Groups

4.17 There are many kinds of food and we have seen that most of them are mixtures of nutrients. Even so, it is sometimes useful when teaching to put foods of the same kind together into groups. Foods are usually put into 3 groups, depending on the nutrient they have the most of. These groups are the *body-building or protein foods*, the *energy foods*, and the *protective foods*.

Sometimes a food does fit in more than one group. For example, because they are 78 percent carbohydrate, wheat, maize and rice are put with the energy foods, but they have at least 8 percent protein and they can go into the body-building group as well. Many people who eat these foods usually eat so much of them that they get most of their protein from them. Dark green leaves are in the group of protective foods, but they have a useful amount of body-building proteins as well.

THINGS TO DO

1. *Make a food collection.*

Make a collection of as many different kinds of food as you can. (A collection is many things put together into groups.) All members of the class can be asked to bring a different kind of food with them to class. If some foods cannot be found, pictures of these foods can be used. If these things are not possible for some foods, write their names on paper. After this class meeting some foods can be put in plastic bags to be used in another class meeting.

Use this collection in as many ways as possible.

- a. Divide the collection into food groups (Section 4.18).
- b. Divide the collection into a group of plant proteins and a group of animal proteins (Sections 3.5 and 3.6).
- c. Put foods together to make examples of 2 plant protein and one animal protein.

- d. Put the foods in a line with the cheapest foods at one end and the costly foods at the other end.
- e. Put the collection in a line with the food with the highest percentage of protein at one end and the foods with no protein in them at the other end.

In other chapters we will use the food collection again. So that the food does not have to be kept, it is a good idea to have food collection work at the same time as the cooking classes. The cooking can help learning.

2. *Collect fruits and nuts that are not grown by men.*

In some areas, families eat many kinds of fruits, roots, and nuts from the bush. Many times these have useful amounts of nutrients and families should go on eating them. Make a list of a collection of these foods and the time of the year when they can be found in your area.

MORE ABOUT FOOD

Hunger

5.1 Now that you know about nutrients, it is time to think about hunger and the meals we should eat.

Though adults usually do not want to eat as many times a day as children do, most people eat more than one time a day if they can. It may then seem a strange question to ask — why do we eat? It is only part of the answer to say we eat to stop feeling hungry. The more important reason is that we eat because our bodies need food to keep living and stay healthy.

*THE FEELING OF HUNGER LETS US KNOW
THAT OUR BODY NEEDS FOOD*

Though a feeling of hunger lets us know when our bodies need food, this is not always so. A person who has not had much food for a long period of time may not feel as hungry as a person who usually eats a lot and just missed one meal. On the other hand, the person who has gone for a long time without food and then has food will feel full very quickly. Some malnourished children with kwashiorkor refuse to eat at all and have to be forced to take food, even though they may be dying from not having enough protein. However, children with marasmus are different — they are hungry all the time, unless they have some other disease also.

MALNOURISHED CHILDREN MAY NOT FEEL HUNGRY

Hunger may let us know that we need food, but it only makes us want to eat any food, not the special nutrient we need most. It is true that a person sometimes wants some special foods, like meat or eggs, and feels very hungry for them, but a person will not feel

hungry for only protein foods just because his body does not have enough protein. Usually a person stops feeling hungry if he eats any kind of food.

Hunger and Fasting

5.2 In many areas, there are customs for people to fast (not to eat) at some times of the year. Many poor and hungry people fast. They may not eat one meal or may not eat for a whole day or even more than a day. Sikhs fast on the Shabdasdi days of their Gurus. Hindus fast many times a year, such as Janam Ashtami and Pooran Mashi. Muslims do not eat in the day but eat only at night for the 20 days of Rosa (Ramadan). Some Christians stop eating foods for Lent. When someone fasts, he loses the protein and calories he would have eaten on that day. If he fasts many times, he will lose that much more protein and calories. He will become thin and will not work hard. He may even get used to not eating. He may not feel hungry and may eat less than he should even on the days he can eat. Fasting may be good for a person who eats more than he should or for a person who is fat because he may get thin while he fasts and may learn to eat less. But fasting is dangerous for a person who is underweight or who does not have enough food to eat. He may get weak and not be able to work. He may become ill and may even die. Fasting is very dangerous for children and pregnant women because, as we have seen, children and pregnant women need much protein and energy foods. You should try to explain this to the family and see that pregnant women or small children do not take part in fasting.

*FASTING IS DANGEROUS FOR CHILDREN
AND PREGNANT WOMEN*

Hunger may be stopped by energy foods before the body has eaten enough protein, and hunger may be changed by the kind of food people eat. If a person eats mostly carbohydrate foods without enough protein, he may feel less hungry and then eat less food of any kind. A carbohydrate energy food like sweet potatoes only will stop hunger and give the body the calories it needs, but it will not give enough protein. This is why food must have enough protein to give a person the protein

he needs *before he eats so many calories that he does not feel hungry any more*. This is why meals, most importantly the meals of young children, must have not only enough protein, *but enough protein in comparison to the calories they have*.

Hunger and Bulk

5.3 We say that a meal is “bulky” when there is only a small amount of nutrient in a large amount of food. A small amount of cornmeal can be mixed with water to make a large amount of porridge. This porridge is very “bulky” but does not have many nutrients. In the same way, a small amount of milk can be mixed with a large amount of water to make a very bulky food for a child. When a mother puts much water in her child’s milk, he is not drinking enough milk to give him the nutrients he needs. He will be underweight and may even get marasmus. Teach mothers not to put too much water in the milk they give to their children.

We shall discuss later in this book about how to make **certain** that a young child eats enough protein as well as enough calories.

Nutrients to Stop Hunger

5.4 What foods do we need to stop feeling hungry and to stay healthy? What foods does a child need to grow? First of all, *we must eat all 3 kinds of nutrients*: body-building proteins, energy-giving carbohydrates and fats, as well as protective vitamins and minerals. If possible, we must eat some of these 3 kinds of nutrients at every meal.

Second, *we must eat enough of these nutrients*. How much of these nutrients we should eat will depend on what kind of person we are. Men, women and children all need different amounts depending on their age, weight and activity. We will learn more about this in Chapter 6.

The Balanced Meal

5.5 If adults are going to stay healthy and be able to work hard, and if children are going to grow, they need enough of the three kinds of nutrients. A meal that has the right amount of body-

building protein, of energy-giving carbohydrate, or fat, as well as protective foods and minerals is called *a balanced meal*. Every meal does not have to be balanced, but most of them should be.

The Protein First

5.6 We know that animal proteins are not at all cheap, and that most families have to eat plant proteins. We learned in Chapter 3, however, that one plant by itself is not good enough as a body-builder, and that plant proteins are better body-builders if they are mixed. We also learned that at least a small amount of animal protein should be eaten, as well, if it is possible. A balanced meal should not have just one plant protein, but it should have two plant proteins and a small amount of animal protein also if possible. Or it might have a good amount of animal protein with one plant protein.

ONLY ONE PLANT PROTEIN DOES NOT MAKE A BALANCED MEAL

Now For the Carbohydrate

5.7 Carbohydrate or fat is useful in two ways: (1) it gives the energy that the body needs; and (2) it keeps the protein that is eaten from being burned to give energy. (Protein can be burned to provide energy; one gram of protein gives 4 calories or 17 KJ of energy.) If there is only protein in a meal but there is no carbohydrate or fat, this protein will be wasted because it will all be burned to provide energy and not be used for body-building which is its proper purpose. Money is wasted, in addition, because one must pay more for protein than for carbohydrate.

Fat is useful for cooking because it makes food taste good, and it gives many calories of energy in a small space or bulk. Though it is not necessary, it is very good if about 15 percent of the calories we need come from fat. There are problems with fat. A person must pay much money for it and sometimes more than a small amount of it can make people feel ill. If there is some carbohydrate in every balanced meal, we do not have some of the problems with fat.

Protein and carbohydrate are different in a very important way. If a person eats more carbohydrate than he needs, his body

makes it into fat and keeps it. This is what makes people fat. Though the body can store carbohydrate, it cannot keep more than a small amount of protein. If a person has a large meal of protein and eats much more than he needs, the amino acids from it are broken down and are used for energy or are made into fat. This wastes the protein. If people cannot get very much protein, they should eat only a small amount at every meal, instead of eating it all at one meal. If it is eaten all at once, it will be wasted because it cannot be kept in the body.

The Protective Foods - the vitamin and mineral foods

5.8 Every balanced meal should have food such as green vegetables or fruit. If it is not possible to make every meal in the day a balanced meal, it is enough to eat fruit and vegetables once a day because the body is quite good at keeping vitamins and minerals.

Some Examples of Balanced Meals

5.9 All these meals have protein, carbohydrate, and **protective** foods:

Two plant proteins —

wheat chappati — groundnuts — palak
 maize chappati — dal — guava
 rice — dal — mango
 wheat chappati — curry with potatoes and some
 other vegetables (such as peas, cauliflower,
 pumpkin, etc.) — oranges

Two plant proteins and a small amount of animal protein —

maize chappati — groundnuts — meat - Papaya
 rice — gram — fish — bers
 bajra — dal — egg — sweet lemon or orange

One plant protein and some animal protein —

potato — meat — gram — tomato
 bajra — fish — banana
 mashed chappati — mother's milk — dark green
 leaves (sag - very important and very cheap)

Animal protein alone —

potato — meat — orange (not cheap)
tapioca — eggs — carrots (not cheap)
mother's milk (free, you do not have to buy it)

When you make a balanced meal, remember that wheat, maize and rice are all about 8 percent plant protein and have much carbohydrate as well. Potato has little protein (2%) but may be an important food item because it can be combined with other food such as eggs or milk. Only one plant protein such as gram or dal does not make a balanced meal when eaten with potato, but it does make a balanced meal when eaten with wheat, rice or maize. In the list above we have put dark green leaves as protective food, but as you know, dark green leaves are very useful because they have about 5 percent protein, also.

It may surprise you to see mashed chappati and mother's milk and dark green leaves on the list as a balanced meal. This is one of the most important balanced meals there is because mother's milk is the best animal protein of all for a young child. This is why the children of poor families, who have only very small amounts of protein food, should go on breast-feeding till they are 18 months or 2 years old. Mother's milk is a balanced meal by itself because it has protein, calories of energy, and protective foods. The only thing it does not have is iron. When a child is 6 months old, he cannot live on breast milk alone. He must have large amounts of porridge (khichri, suji, halwa) with protein and protective foods added, iron most importantly. But you should remember that the animal protein a child gets from his mother's milk for his first 18 months or 2 years is very important. It gives children of poor families the small amount of animal protein which they may not be able to get from other foods.

Mixed Foods

5.10 One important thing about a balanced meal is that the foods are mixed — that is, different foods are eaten together. This balanced meal is different from many village meals which have only 2 foods that are mixed. Many times a village meal may be only chappatis, possibly with some onion or peppers. This is poor food as it only mixes staples with some taste.

If a food is mixed, it is almost certain to have a mixture of proteins. This is why we should attempt to teach mothers that *a good food is a mixed food*. This is a useful thing to teach because a mixed food will probably make a balanced meal.

A GOOD FOOD IS A MIXED FOOD

In countries where food is very mixed, there is almost no malnutrition. In some parts of India, food in the villages and among the poor and middle class in the cities may not be mixed enough. India has many good mixed foods, but people eat them only on holidays. It is important and necessary that all girls and mothers know how to make these good mixed foods and know how much of these foods are needed for good nutrition. Lady health visitors and auxiliary nurse midwives have a very important job to do — they can help to find easy ways of making these foods so that busy mothers can make them quickly.

Milk

5.11 A mother makes milk as a food for her child. In India today, people drink different kinds of milk: mother's milk, buffalo's milk, cow's milk, and sometimes goat's milk. In Table 5.1 below we can see that buffalo milk has much more protein and fat than human milk, but it has less carbohydrate. Cow's milk has more protein, less carbohydrate, and somewhat more fat than mother's milk. Goat's milk has as much protein as buffalo milk but has less fat.

Table 5.1
DIFFERENT KINDS OF MILK

	Protein	Fat	Carbohydrate
Breast Milk	about 2%	about 4%	about 6%
Cow's Milk	about 4%	about 4%	about 4%
Buffalo's Milk	about 3%	about 6%	about 5%
Goat's Milk	about 4%	about 4%	about 4½%

Mother's milk is 100 percent used for body-building. Cow's milk is one of the next best foods for children. It is 75 percent used for body-building, which is also true of buffalo's milk as well as goat's milk.

Milk is only about 2 to 6 percent protein, which is less than that of wheat, maize, or rice (which are 8 to 10 percent). But a young child can easily drink a lot of milk and get a lot of protein. It gives him most of the water that he needs, and much of the energy he needs, as well. If possible, children should be given as much as a litre of milk a day. Many times there is no milk to buy, or people do not have enough money to pay the high price for fresh milk and full-cream milk. Many children will have to get most of their protein from plants such as wheat, maize and rice, and from grams, dals and groundnuts.

The milk from animals is used in many ways. Milk is put in tea and coffee. The more milk that is put into these drinks, the better food they become for adults. This is the only kind of animal protein many Indians get.

Milk Foods That Can Be Made At Home

5.12 Curd (dahi) is the most important food made from milk.

It is easy to make and is as good a food as ordinary milk. Curd is even better when a child or an adult cannot digest the carbohydrate (lactose). To make curd, you boil milk and then let it cool slowly. Add $\frac{1}{4}$ teaspoon of old curd to 2 cups of the cooled milk and mix it well. Let it stand in a closed pot overnight and the curd will be ready to eat the next morning.

Buttermilk (lassi) is made by adding water to curd or by keeping the liquid (water) left after making butter. People who have been out in the heat and feel the need to drink, like to drink lassi. Lassi has the protein and the salt of milk. Some people add water to lassi to make more so that more people can drink it. This is still a good drink, but there is not much food in it.

When milk is boiled on a slow fire for some hours, it is made into khoya. Khoya is very good. It has less water than ordinary milk and more protein, fat, and carbohydrate. Any micro-organisms (germs) that may have been in the milk die because of the long boiling. Khoya is used in milksweets, gajerella, and many other foods that are only eaten at very special times. All these foods have a lot of protein and calorie giving fat, but they take a long time to make. Most mothers do not have time to make them very often.

Butter and ghee are the fat of milk. One must pay a lot of money for them, but they do not have any body-building protein. Dalda and other oils are pure fat, but they are much cheaper than butter and ghee, so they are a better buy. But one still may have to pay a lot of money for oil or dalda.

Different Kinds of Dried Milk

5.13 When milk, fresh from a cow, stands in a glass for a time, the fat comes to the top as a yellow part named cream. This is why milk fresh from the cow is named *whole milk* or *full cream milk*. Sometimes, before people buy it, milk is mixed in a special way so that the fat cannot come to the top (separate). In this *homogenized milk*, the cream is still there. Homogenized milk can be bought in cities only.

When cream is taken from whole milk, the milk is named skimmed milk or *skim milk*. Skimming means taking out the cream. People can buy the cream taken out as it is, or made into butter.

Water can be taken out of the milk to leave a powder named *dried milk*. If water is taken out of the full cream milk, *full cream dried milk powder* is left. This is 26 percent protein and 26 percent fat (cream). If water is taken out of skim milk, *dried skim milk powder* is made. This has 36 percent protein and almost no fat (cream).

As you can see, dried skim milk powder has more protein (36 percent) than dried full cream milk powder (26 percent). This is because water *and fat* are taken out when dried skim milk powder is made and the protein is left behind. When you buy one kilo of dried skim milk powder, more of what you buy is protein; but when full cream milk powder is made, only the water is taken out. The protein and the fat are still there. So when you buy one kilo of full cream milk powder, some of it is fat and less of it is protein.

Dried skim milk powder is about 51 percent carbohydrate (lactose). It is, then, about half lactose. This is important because if dried skim milk is not used in the right way, the lactose in it sometimes gives children diarrhoea.

When milk is skimmed, butter and cream can be made and some people will pay much for them. But skim milk is still cheap.

*IN CITIES, PROTEIN CAN BE HAD MORE CHEAPLY
BY BUYING SKIM MILK IN PLACE OF FULL CREAM MILK*

Some people think that dried skim milk is not a very good kind of food. They think that because it has been skimmed, there must be something wrong with it. This is not so. Only the fat and the water have been taken out, and the very good protein is still there. We must attempt to teach people how good dried skim milk is and teach them to want to buy it.

Because dried skim milk has had the fat taken out, it is not a good food for a very young child less than 4 months old. It has more protein than he needs and does not have enough calories for him. Sometimes it does not have enough vitamins. If a very young child has to be fed on cow's milk, it should be full cream cow's milk. On the other hand, dried skim milk is a very good food for a child more than 4 months old who has started to eat porridge. The best way to give a child dried skim milk is to add it to his porridge. Have mothers add a spoonful to every plate of porridge (dahlia, suji, khir or khichri) as they make it for their children. *Dried skim milk should NOT be given to a child from a feeding bottle.*

*DRIED SKIM MILK IS USED BEST
WHEN ADDED TO A CHILD'S PORRIDGE*

Frequently at Under Fives Clinics, underweight children are given free dried skim milk. Some mothers only come to a clinic so that they can get this milk. (Only giving dried skim milk to mothers will not take the place of the right nutrition education.) If dried skim milk is given to the mothers, they must be taught how to use it — that is, they must learn to add it to their children's porridge. *Giving dried skim milk to mothers must not ever stop clinic workers from helping and teaching mothers how they can feed their children on the foods that they can buy and grow themselves.* Mothers should be taught to buy dried skim milk in the shops if it is there for them to buy, and if it is sold at a price they can afford.

Condensed Milk

5.14 There is a kind of liquid milk in tins called *evaporated milk* (such as "Ideal"). It is made from full cream cow's milk from which *some* water has been taken. It is very easy to mix, but it is not cheap, and is not better than fresh milk. Try to have mothers give breast milk or fresh buffalo's or cow's milk to their children. *Many mothers will not be able to give their children enough milk. They will have to use mixtures of plant proteins with small amounts of animal protein if they have it.* This is why we have said so much about plant proteins and the importance of mixing them.

Sugar

5.15 White sugar (chini) and glucose are pure carbohydrates or pure energy food, but are not necessary foods. Too much sugar may cause caries or holes in the teeth. We should teach mothers not to buy them. Wheat, maize, and rice all give energy more cheaply and as easily as sugar. If a mother wants to use sugar, she should know that brown sugar made in the villages (jaggary or gur) has some iron, and also is cheaper than white sugar. It is better to use jaggary instead of refined sugar.

Water

Safe Water

5.16 By safe water, we mean water that has no harmful micro-organisms (germs) which can cause disease. Many micro-organisms can live in water and some of the most dangerous are those which cause diarrhoea. Micro-organisms usually get into water from the gut (stomach, bowels, intestines) of other people. If water for drinking or cooking is taken from the same stream or pond where everyone bathes or wash their clothes, there might be a large number of micro-organisms in their drinking water and food. Also in rural areas in basties and in the outskirts of cities, people usually defecate near water and wash themselves afterwards. Thus faeces containing many germs get into the water, which people might use for drinking or washing. Safe water is water which is not mixed with human *faeces* or *urine*. By human faeces we mean the stools or waste from the

bowels of people, and urine is the waste water from the body. Animal faeces can be harmful, but they are not nearly as dangerous as the faeces of man. Human faeces must be kept out of food and drinking water. Even a very, very small amount — much less than we can see with our eyes — can be dangerous.

KEEP DRINKING WATER SAFE FROM HUMAN FAECES

Ways in Which Faeces Get Into Food and Water

5.17 Faeces usually get into food and drinking water in one of these three ways:

(1) Through the ground or in streams and rivers. If wells for drinking water are very near to pit-latrines for faeces, harmful micro-organisms can go through the ground and get into the water in the well. Because of this, latrines and wells must be separated as far as possible so that micro-organisms cannot get from the latrine into the water. Wells and latrines should be separated by at least 50 meters and the top of a well should be well protected with cement. That way, the only water that can get into the well has to come from deep in the ground. No water should be able to get into the well from the top where it may get dirt and even faeces with harmful micro-organisms (germs) in it.

It is very important that everyone pass his faeces and urine into a latrine where they will slowly be made harmless. They should not be passed into any river or stream from which drinking water is taken. Springs should be protected so that clear water can be taken from them easily and there is no chance of the water being mixed with human faeces.

(2) On fingers. When a person passes his faeces or urine it is possible that micro-organisms from his faeces or urine will get onto his fingers while washing himself. Also, a mother might get faeces on her fingers while cleaning her baby or small children. If he or she then gets water or touches food, these micro-organisms may get from his fingers into the food. They are probably not bad for the person from whom they came, but they may be bad for other people who eat the food. We all must wash our hands before cooking food. This is even more important if we cook food for many people.

**IT IS IMPORTANT TO WASH YOUR HANDS BEFORE TOUCHING FOOD
OR GETTING WATER FOR DRINKING**

(3) Through flies. Micro-organisms from faeces get on a fly's feet and then fall off into our food. Because of this, faeces must at all times be passed into a latrine which is protected from flies or covered with earth, and flies must be kept away from food.

ALWAYS WASH YOUR HANDS BEFORE COOKING FOOD

Boiled Water Is Safe

5.18 In town the water that comes through a pipe has chlorine which kills any harmful micro-organisms that may have gotten into the water. Such water is said to be "*chlorinated*." If you are not certain that water is safe, and if you think it is possible that human faeces have gotten into it, *boil it*. Because boiling makes micro-organisms die, water which has been boiled is safe to drink. You do not need to boil it for many minutes; all you need to do is let it boil, be certain it is boiling well, and then let it become cool. A good way to keep drinking water is to boil it and then put it into a clay pot with a lid so that flies cannot get to it. Because a clay pot lets a small amount of water through, its outside is damp (a bit wet) at all times. If the pot is in a place where the air is blowing past it well, some water will evaporate (go into the air) from the outside of the pot. The evaporation of this water cools the water inside the pot so that it is cool to drink.

When it is possible, everyone should drink safe water. It is very important that a young child should drink safe water; at all times he should have water that has no harmful micro-organisms which may give him diarrhoea. This is why a young child should be given boiled water if he wants to drink, and why an *artificial feed should be made with boiled water*.

**IF A CHILD WANTS TO DRINK
GIVE HIM COLD BOILED WATER OR LASSI**

Much fire is needed to boil all the water a family drinks. Some families do not have enough dung or dried grass to boil all their water. But they may be able to boil the water for their small children. Teach them to do this.

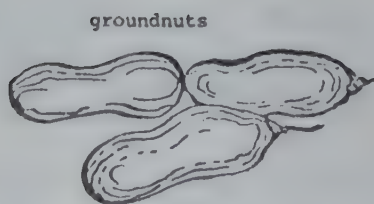
Underweight children get diarrhoea much more frequently than well-nourished ones. Families should attempt to keep their children well-nourished so that the children will have less chance of getting diarrhoea if they drink water that has not been boiled. When a well-nourished child does get diarrhoea, he will not be as sick as he would be if he were malnourished. Another thing that mothers can do is breast-feed their babies and small children. There are no micro-organisms in healthy breast milk.

A Food Poison

5.19 There is a food poison you should know about — *aflatoxin* in groundnuts.

When groundnuts are not properly dried, moulds grow on them. A mould is a very small plant which covers the thing it is growing on with very thin hairs. One common mould in groundnuts makes a poison, aflatoxin, which is very bad for animals and men. You should be certain to dry groundnuts as much as possible and do not let them get damp (a bit wet). Dampness will help the mould to grow. In the monsoon wet weather, powdered groundnuts grow mouldy very easily.

KEEP YOUR GROUNDNUTS DRY



If groundnuts are allowed to grow mouldy the mould may make a poison in them - keep groundnuts dry

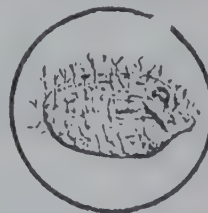


Figure 5.1
FOOD POISONS

the mould that makes aflatoxin in groundnuts makes them go yellow, it cannot be seen without a microscope

THINGS TO DO

1. *Make a collection of foods that are common in your area in this season.*

Think about at least two balanced meals for adults and older children that you could make with this food collection. Then think of two ways to make food for a child of 6 months of age with this food collection. (Remember that the child is probably getting breast milk.) Let the class select and make one of the balanced meals as well as the additional food the mother could make using the same foods. How does it taste? Was it simple and quick to make? Perhaps you could make the other balanced meal. How does it taste? Which is better? Was this meal easier to make? Can the mother make good additional food for her 6 month baby with the same foods? How?

2. *Make your own nutrition word list.*

This is a list of important food words in English that you can write in your own local language.

bread (or other staple)
food
food eaten with the staple (relish)
children's porridge
grams and dals
cassava and potatoes
chicken
colostrum *
dark green leaves
eggs
energy
fat
fish
fizzy drink

Sometimes one of these words may mean several words in the local language. Be certain to write them all. Add any other food words that are important in your district.

* Colostrum — liquid which comes from the breasts of pregnant women before milk comes.

CHAPTER 6

PROTEIN AND CALORIE NEEDS

A child needs protein for growing and a pregnant woman or a breast-feeding mother needs extra food to give her growing child. We learned that everyone needs protein for repairing his body and that everyone needs energy foods so that he can work and keep warm. In this chapter we will learn how much body-building protein and how many calories of energy different kinds of people need.

The Protein We Need

6.1 Because the amount of protein a person needs every day depends on how he is growing and on how much he weighs, a growing child needs more protein for every kilo of his weight than an adult. A large person needs more protein every day for the building of his body than a small person needs. How hard a person works makes no difference in the *amount of protein* he needs.

In Table 6.1 (see next page) column 1 lists different kinds of people and column 2 lists how much these people should weigh. Column 3 lists how many grams of egg or reference protein a person needs every day for every kilo of his weight.

From 7 to 12 months a child needs about one and a half (1.53) grams of protein every day for every kilo he weighs. But when he is an adult and has stopped growing, he needs only about half a gram of protein a day for every kilo he weighs (0.57 grams per kilo for a man and 0.52 grams per kilo for a woman). A child in his first year needs about 3 times more protein for every kilo of his weight than an adult ($3 \times .5 = 1.5$). In addition, you will see that because a boy or girl is growing, he or she needs more protein per kilo of weight than an adult. The important facts to remember are that an adult man needs about 30 g reference protein every day and an adult woman needs about 25 g. It is useful to remember that an adult needs about half a gram (.5g) of reference protein for every kilo he weighs and that an infant needs about one and a half grams (1.5) of protein for every kilo.

Table 6.1
PROTEIN NEEDS

1	2	3	
Age and Sex	Weight in Kg	Grams of Egg or Reference Protein Needed Every Day	
		Per kilo per Day	Per Person per Day
Infants:			
7-12 months	9.0	1.53	13.8
Young children:			
1-4 years	10.0	1.19	11.9
4 - 7	17.5	1.01	17.7
7 - 10	24.0	0.88	21.1
Boy:			
10 - 13	28.0	0.81	22.7
13 - 16	40.0	0.72	28.8
16 - 20	50.0	0.60	30.0
Girls:			
10 - 13	28.0	0.76	21.3
13 - 16	40.0	0.63	25.2
16 - 20	40.0	0.55	22.0
Adult:			
Male	50.0	0.57	28.5
Female	40.0	0.52	20.8
Pregnancy *		6.0	26.8
Breast Feeding *		17.5	38.3

* Extra grams of protein needed each day for pregnancy and breast feeding

A woman needs about 6 gms of extra reference protein when she is pregnant and about 17.5 gms extra when she is breast-feeding. A breast-feeding mother needs more protein than a pregnant woman because her child is not as small. She needs 37.8 gms of protein instead of 21 gms needed for a non-pregnant woman. The 6 g of extra protein needed by a pregnant mother is the average for pregnancy. Early in pregnancy, when her baby is small, she needs less than this. As her

baby gets bigger, she needs more. If we divide the 9 months (40 weeks) of pregnancy into 4 parts, we can say that one extra gram of protein is needed every day for the first part, four extra grams per day for the second part, eight extra grams per day for the third part, and ten extra grams per day for the last part.

Most of the protein people eat, such as wheat or maize protein, is not as good for body-building as egg protein which is 100% used for body-building. Because of this, one has to eat more of the less good protein to get the same amount of usable protein. One example of a protein which is not completely used for body-building is maize. Only 55 percent of maize protein is used for body-building. Since only 55% of the maize protein can be used, an adult needs about 52 gms of maize protein to get 28.5 gms of useful protein.

It may be easier to think of the amount of maize protein a person needs every day if we think of handful, not grams. A handful of maize meal weighs about 50 g and has 4 g of protein. To give him the protein he needs, an adult man needs 52 gms of maize protein or 13 handful of maize meal ($52 \div 4 = 13$). If you think that this is a very large amount of maize, you should remember that when other proteins are eaten with maize, you have a better chance of getting the nutrients (essential amino acids) you need. The food value of the *mixed food* goes up and less food will give you the protein you need.

People are different from one another. Not every 1-year-old child weighs exactly 10 kg, and not every child between 7 and 12 months needs exactly 1.53 g of reference protein per kilo. Some children need more and other children need less. The amounts of protein listed in Table 6.1 are named "*safe levels*." We can be certain that if people eat these amounts of protein, almost all of them will have the protein they need.

The Calories We Need

6.2 Different kinds of people need different numbers of calories of energy food every day. The amount of calories a person needs depends on how big he is and on how hard he works or plays.

Table 6.2 (see next page) has much information for us. Column 2 gives common weights of children of different ages. Column 3 lets us know how many calories the children need for every kilo of their weights. At the top of column 3 you will see that a child in his first

year needs 113 calories for every kilo he weighs. At the bottom of Table 6.2 you will see that an adult needs only 46 calories per kilo of his weight. We can see that a child in his first year needs more than 2 times as many calories as an adult *per kilo of weight* ($46 \times 2.5 = 113$). An adult weighs more than a child who in his first year needs only about 790 calories every day. An ordinary man doing a very easy job needs 1900 calories every day and an adult man doing hard work needs more, about 2300 calories or 10 MJ every day.

Table 6.2
CALORIE NEEDS PER DAY

Age of Person	Weight ** in Kg of the person	Calories/Kilo Joules Needed Every Day			
		Per kg per day		Per person per day	
		Calories /	KJoules	Calories /	KJoules
0 - 1 year	7.0	112	469	780	3283
1 - 2 years	10.5	103	431	1100	4526
2 - 3 years	11.5	100	418	1150	4807
4 - 5 years	14.5	100	414	1450	6003
7 - 8 years	21.0	83	347	1740	7287
10 - 11 years	28.0	74	310	2100	8680
14 - 15 years	40.0	56	234	2240	9360
Adult Man	50.0	46	192	2300	9600
Adult Woman	40.0	40	167	1600	6700

** These weights are common in the given age groups but are not averages or best weights.

YOUNG CHILDREN NEED MORE CALORIES

Most women or more grown girls do not need as many calories as men or boys. If she is pregnant or breast-feeding, though, she will need the same or more. Usually a woman or grown girl weighs less than a man and usually she does not need as many calories per kilo that she weighs.

A breast-feeding mother needs many more calories of energy because she must have many calories of energy to feed the child at her breast. Milk has in it fat or cream which is a good energy food. If a mother is to give these calories to her child, she must first eat them herself. She needs 2128 calories or 500 calories more than she would if she were not breast-feeding.

When a mother is pregnant, she needs 300 calories to give to the child in her womb, or she would then need 1900 calories.

Your body is using calorie energy even when you are sleeping. This energy is used for keeping your body warm, for breathing, and for making your heart beat. When an adult man is sleeping, he uses about one calorie every minute. When he gets up and starts to work, he needs much more energy. The more work he does, the more calories of energy he needs. We only need more calories when we work with our muscles. Brain work needs no extra calories.

Workers do not need extra protein which is needed only for building and repairing the body, not for giving calories of energy for hard work. The people who need extra protein are growing children and pregnant or breast-feeding mothers.

*ADULTS NEED MORE CALORIES
IF THEY ARE WORKING HARD,
PREGNANT, OR BREAST-FEEDING*

Different kinds of work need different amounts of energy. Table 6.3 below lists more about the calorie needs of people doing easy work, hard work, and very hard work.

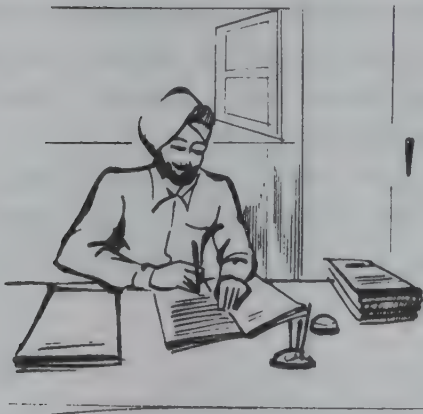
Table 6.3
THE ENERGY WE NEED EVERY DAY
FOR DIFFERENT KINDS OF WORK

Work	Men Calories /Megajoules Needed		Women Calories/Megajoules Needed	
Light (Easy)	2100	8.7	1500	6.1
Hard	2300	9.6	1600	6.7
Very Hard	2700	11.2	1900	7.9
Very Very Hard	3000	12.9	2100	8.9

Figure 6.1
CALORIES ARE NEEDED FOR WORK

This man does little physical work.
He only needs 24 calories an hour more
than if he were resting.

A CLERK



A FARMER

This man needs 240 extra calories
an hour when he is working hard.

In our example, our office worker works, but he does not use his muscles very much and so needs less calories than the farmer. The number of calories we need for doing different things depends on how hard our muscles have to work (cutting down trees needs more energy than writing) and how much we weigh. A big, heavy man or woman needs more calories for doing something than a small, light man or woman. This is because a big person can usually do more work (such as cutting down more trees) and because his body weighs more and needs more energy to move. In Table 6.4 (see below) you can see the calories that men of different weights need for doing different things.

Table 6.4

AMOUNT OF ENERGY NEEDED FOR DIFFERENT TYPES OF WORK
DONE BY PEOPLE OF DIFFERENT WEIGHTS

		Energy Requirements in Kcal/MJ			
		Types of Work			
Weight of Men (in Kg)		Light (Easy)	Hard	Very Hard	Very, Very Hard
50	Kcal	2000	2300	2750	3100
	MJ	8.8	9.5	11.5	13.0
60	Kcal	2500	2700	3300	3730
	MJ	10.5	11.4	13.8	15.6
70	Kcal	2900	3220	3850	4350
	MJ	12.2	13.5	16.1	18.2

**A HEAVY PERSON NEEDS MORE CALORIES
THAN A LESS HEAVY PERSON
BUT HE CAN DO MORE WORK**

Much of this book is about feeding children because children are usually the most malnourished part of the community. But we must not forget the adults, the hard working ones most of all. Many of them are malnourished and do not get the energy they need. If they are farmers, they are not able to work hard and grow more food and so they stay malnourished. Food is so important for hard work that in some factories workers are given cheap meals or even free meals so they can work well.

This chapter has had many numbers in it, but you do not have to remember all of them. The most important things to remember are that everyone needs some protein for body-building and calories for energy every day, and that a child needs more than an adult, per kilo of weight, because a child is growing all the time. A pregnant or breast-feeding woman needs extra protein and calories because she is giving some of them to the child in her womb or at her breast.

In the next three chapters on "Feeding the Family" you will read about the best and easy ways to give a baby, a school child, and a mother or father all the protein and calories they need using the foods that the family in the village has.

THINGS TO DO

Make a food collection:

1. Put the foods in a line with those with the most calories in them at one end and those with the least calories in them at the other end.
2. Use the food collection to plan meals for people at different times of the year, for rich people and for poor people, for people in the town and for people in the country.
3. Ask other members of the class which foods they would give to underweight children to make them grow. Does the rest of the class think that the right choice has been made? If mothers are there, ask them which food they would give to an underweight child.

CHAPTER 7

FEEDING THE FAMILY: BABIES AND THEIR MOTHERS

Breast Feeding

7.1 Breast milk is the perfect food for a baby. It has the right amount of body-building protein that the baby needs so that he can grow. It has much energy-giving carbohydrate and fat, as well as all the vitamins, minerals and water that the baby needs. Breast milk is safe and has none of the micro-organisms ("germs") that are so often found in dirty feeding bottles. Breast milk does not ever go bad — even when a mother is pregnant. It is not ever hot or cold; it is perfectly warm all the time. Mothers who breast-feed their babies have no feeding bottles to clean. When a mother is travelling with her baby, breast milk is there for him on the journey at any time and there are no feeding bottles to be carried and washed. (Some times proper care of the bottle is not easy.)

Much of this chapter is about how important it is that every mother breast-feed her children for as long as she can. She should stop breast-feeding them as slowly as possible. By slowly we mean that a mother should give her child less and less milk over many weeks till she ends by giving him none at all. At the same time she must begin to give him larger amounts of other food.

**BREAST-FEEDING IS THE BEST
SOURCE OF PROTEIN
FOR CHILDREN**



Figure 7.1
BREAST FEEDING

Breast-feeding is the natural way babies should be fed. All other kinds of feeding are named "artificial feeding." The common kind of artificial feeding is bottle-feeding. In Chapter 10 you will read about how dangerous bottle-feeding is and why it is so dangerous. Because breast-feeding is so good and bottle-feeding can be so bad, one of the most useful things that we can do is to help mothers who are breast-feeding their babies.

After a baby is born and first starts to suckle, (that is, to breast-feed), he opens his mouth and feels the nipple placed inside it. His tongue goes under the nipple and pulls it right inside his mouth. Once the nipple is well inside the mouth, the baby's gums (part of the mouth where teeth will grow) push onto the sides of the nipple and the milk will come out of it into his mouth. Sucking is not as important as the pushing on the sides of the nipple by the baby's gums. Farmers who keep cows know this and get the milk out by pushing on the sides of the cow's nipple in the same way. If breast-feeding is going to work well, a mother's nipple must be able to get into her baby's mouth in the right way. In the months of her first pregnancy, a woman's nipples grow in such a way that they can do this.

Do not attempt to teach mothers how to breast-feed. Most Indian mothers have frequently seen how breast-feeding is done and do it very well themselves without your teaching. If you talk about how they should breast-feed, it might not be so easy for them to do it. Not many mothers have trouble with breast-feeding. The most common trouble comes when a young mother has a baby born early or much smaller than average. This baby may not suck well and the mother should then be taught how to *express* milk (see Section 7.2).

Feeding a Baby From Birth Till He Is 6 Months Old

7.2 The milk that comes from a mother's breast in the first days after the child's birth is thin and watery and is named *colostrum*. Because it is very good for babies, they should be put to their mother's breast as soon as they are born. Many babies start sucking almost at once, but if a baby does not start sucking for some hours, wet the inside of his mouth slowly with a very small amount of cold boiled water. This will probably start his sucking.

Most mothers feed their children well through the day, but what about the night? Every mother should take her young baby to bed with her. As we shall soon see, a breast makes more milk when it is suckled from many times in a day and the night is as important for suckling as the day. Because village mothers know this very well, there is no need to teach them. Your own educated friends may need help in this. Some people fear that a baby may be harmed by his mother lying on top of him ("over-lying him"), but this is not true. One of the reasons why so many women in Europe and America are not good at breast-feeding their children is that they do not take them to bed and feed them through the night.

Breast-feeding only is enough for the first six months of a child's life, and there is not usually any need to give him water or other drinks. (When he has diarrhoea, he may need other liquids.)

When a baby is hot and needs to drink something, it is a good idea to let him first get as much as he wants and can find in the breasts. Most of the time this will be enough. But if the child wants to drink, he should be given some cold boiled water from a clean cup, with a small bit of cotton, and not from a feeding bottle. Give a baby this cold boiled water *after* a breast-feed, not ever before. If a baby is given water before he is fed, his stomach will be so full of water that he will not want to drink enough milk.

A mother sometimes says that she does not have enough breast milk for her baby. He may cry soon after he has been fed, and her husband or her friends may say to her that the baby is not getting enough milk and needs a bottle. This is not true because almost all mothers have enough milk. Some babies may cry more than others. They may have stomach pains, but these pains do not mean that they are ill. Sometimes they may want to drink. It is not easy for a family to live with a baby who cries all the time, and it seems to be easier for them to give him a feeding bottle full of milk. This may stop the crying, even though the baby does not need the food. A mother must not start to bottle-feed her baby to stop his crying because it may take him off the road to health and even make him dangerously ill.

DO NOT START TO BOTTLE-FEED BECAUSE THE BABY CRIES

A child's sucking is the best way to make milk come in his mother's breasts. If he sucks well and takes all the milk from her breast, it will make more milk. If he does not suck well and leaves some milk behind, the breast may "think" that it is making more milk than the baby needs and start making less. Giving a baby a feeding bottle does 2 things. One, it fills his stomach and makes him less hungry so he does not suck as well from his mother. And 2, the baby may find that it is easier to suck from a bottle than from the breast, and he does not want to work hard at sucking from the breast. These two things may make him suck less hard and the breast will then make less milk. When this has been happening for some weeks, the amount of milk in his mother's breast will be so small that he will need his bottle for food. Since bottle feeding is very dangerous, it may make him ill or die. For this reason a baby must not be given a feeding bottle because he cries when he is only a week old.

Again, most village mothers know very well that a baby that cries much of the time may want to suck more and may want its mother to look at him. If any mother asks questions about the crying of her baby, let her know that many babies cry, and that it is usually because they are more active than other babies. The mother should know that she should breast-feed the child when he seems to want it and that the more he sucks the more milk will come. Do not let a mother give the baby a bottle!

**A BABY'S SUCKING MAKES MILK COME IN
HIS MOTHER'S BREAST**

A baby who gets the breast any time he "asks for it" will usually get enough milk. A baby who gets the breast when he wants it is a happy baby. All villagers know this very well. Some educated people think breast-feeding should be done at certain special times, but this is not right, and it may mean that the baby does not get enough milk. Then the baby and his mother will not be very happy.

**A MOTHER SHOULD GIVE THE BREAST
ANY TIME HER BABY WANTS IT**

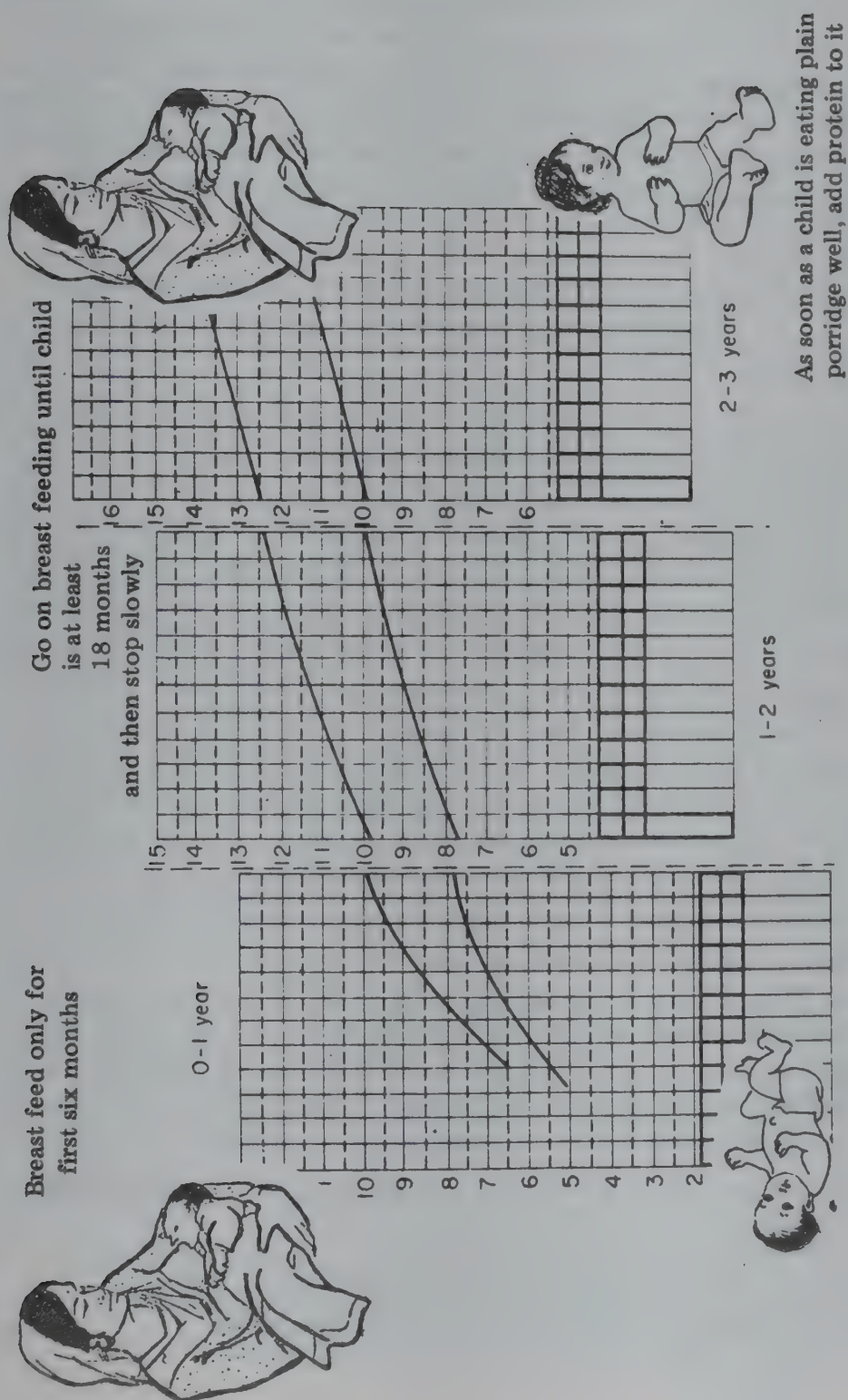


Figure 7.2 — FEEDING THE YOUNG CHILD

If you or the mother think that a child may not be getting enough milk, you should weigh him and then weigh him again the next week. If he is heavier and has grown, he must have been getting enough milk. Most babies will have gained weight. A very small newborn baby may not suck well. You should follow his weight very carefully and ask the mother how the child sucks because some small babies who do not suck well cannot be fed very well with their mother's breast.

**EVEN BABIES WHO ARE SO SMALL THEY CANNOT SUCK
STILL NEED THEIR MOTHER'S MILK**

When a very small baby cannot suck very well you have to teach his mother to express (push out) her breast milk. The milk must be expressed from the breast into a very clean bowl. The mother needs a clean katori and a helper to hold it. The mother and the helper should first wash their hands very carefully. The mother should sit on the charpoi with her feet hanging down and roll up her shirt. She should wash her breast and nipples very carefully with soap and water. After drying her breasts, she can start to express (push out) the milk. She should hold her left breast up with her left hand and use the right hand to massage (to rub or push carefully) the breast from the outside toward the nipple. As she reaches the nipple, she should push it together between the right thumb and first two fingers. A small amount of milk will come out and should be caught in the katori. When the milk stops coming, her right hand should slide back to the outside and start massaging again doing exactly as she did the first time. This should be done on one side for about ten minutes or till no more milk comes out. Then the breast on the right side should be massaged in the same way till no more milk can be expressed from it. A bit of cotton can then be put into the milk and the child can suck the milk from the cotton. You can help the mother know how this is done. Sometimes a special *dropper* can be used. The child should be fed all the expressed milk while it is fresh.

**A BABY WHO DOES NOT SUCK WELL
SHOULD BE FED BY DROPPER OR COTTON**

If there does not seem to be enough milk in the mother's breast, some fresh cow's milk can be fixed as in Section 10.9, and some of this can be given as well.

It is very important to go on taking as much milk as possible from the mother's breast. This will make the breast go on making some milk, and when the child is big enough to suck strongly he can feed from the mother again, and there will be more milk. If no milk is taken from the breast, it will dry up, and then the baby will have to have other milk at every feeding.

Weigh every baby sometime in the first days after birth. Any baby who weighs less than 2500 gm may have trouble sucking, so be certain to visit the family every day for the next week and make certain they know how to feed the baby.

Any baby over six weeks of age who does not gain as much weight as he should and who seems well and healthy should start to take a small amount of porridge from a cup and spoon. In addition he can be given some boiled milk, with water and sugar added, as in Section 10.9. *The baby must go on breast-feeding.* He needs to be given these extra foods *after* breast-feeding, and after the child has taken all the milk he can get from the breast.

Sometimes, when a mother has no milk at all, one of the women in her family may be breast-feeding a child and may be able to give the baby some milk. It is quite safe for a baby to suck from another person in the family. If the mother is not well and not able to breast-feed, it may be useful to ask if this is possible, before you think of teaching the mother how to bottle-feed. Be sure to avoid bottle-feeding if it is at all possible to give the baby breast milk from mother or another relative.

Last of all, be certain to teach any mother who is not doing well breast-feeding that she must feed herself well. If she is malnourished herself, she will certainly have less milk for her child. The mother should take enough calories and protein for making good milk.

How Many Times a Day Should a Child Be Fed?

7.3 When a breast-fed child is being carried by his mother, he can easily be fed as many times as he wants. Women usually do this very well, and these children grow very well. Many women have

to go to work in the fields and cannot take their babies with them. They breast-feed the child only when they can, but this is usually not very good for the child. It can be very bad at harvest time when the mothers may be out in the field for many hours at a time. The children will need more porridge than those who can get a breast-feed whenever they want it. As many children get older, their mothers do not give them enough meals in a day.

The Child's First Porridge

7.4 A mother's breast milk usually give a child all the food he needs till he is about six months old. But when he is six months old, he has become so big that breast milk is not enough by itself and his mother should start to give him porridge. If a child is to go on growing well, he must eat porridge, as well as breast milk, before he is 7 months old. Most children get their first tooth when they are about 6 months old, so a child should be eating porridge by the time he gets his first tooth. Some mothers do not give a child his first porridge till he reaches out for food with his hand. Most children start to do this at about 6 months. This is about the right time to start having porridge.

*START TO GIVE A CHILD PORRIDGE
WHEN HE IS 6 MONTHS OLD*

At first a mother should give her child porridge once a day when he is most hungry. When he is eating it well, he can have it 2 or 3 times. Wheat, maize, rice and bajra are all about 8 percent protein. When you add some more protein, they make good porridge for young children.

The porridge for children about 6 months old should be thin and made with some milk. Dahlia, suji, khir, and khichri are all very good porridges for children. You will read in Chapter 8 how to make them. After the children are used to these milk porridges, the mother can make and feed the child a porridge with plant proteins such as pounded groundnuts, mashed gram, or dal flour. Find the ways to make these in Chapter 8.

By the time a child is 7 to 8 months old, he needs these foods and he must be eating them well. If he is only taking breast milk, he is not getting enough calories or protein.

When a child is first given porridge, most of it falls out of his mouth. This is because he has been sucking from a breast and does not know how to get food into his mouth from a spoon. And it is because his tongue is not used to the feeling of food. He has to get used to this new food and learn how to get food from a spoon. His mother can teach him these things by giving him 1 or 2 small spoonful of the new food once a day for the first 3 or 4 days. She should give him only 1 new food at a time. She should not give another food till he is used to the first one. If a mother gives small amounts every day for many days, she can get her child to eat most foods. When a mother is starting to give her child a new food, she should give him the new foods when he is hungry, before he has had his breast milk. Because he is hungry, he will eat the food and get used to it. But after a child likes a food well, he should be given the food *after* he has taken all the milk he can from the breast. This is important because a child will not suck strongly if he is full of porridge when he is put to the breast. If the baby does not suck well, the amount of milk in the breast will get less. This is bad because a child needs *all* the breast milk he can get even though he is eating other foods.

*AS SOON AS A CHILD IS EATING MILK PORRIDGE WELL,
GIVE HIM PORRIDGE WITH PLANT PROTEIN*

A mother may say that some food, such as groundnuts, makes her child cough or choke. A whole groundnut may cause this, but pounded groundnuts are quite safe. Any baby who is learning to eat may cough, but it is not because of that kind of food. His mother must not stop giving it to him because she thinks it makes him cough. He needs that food and must go on getting it.

A healthy breast-fed child has a soft yellow stool. As he starts to take porridge and other foods, his stool changes and becomes more like that of an adult. A mother is sometimes worried about the change in her child's stool as he changes to a new food, and she may think that the new food is not good for him. You should let her know that it

does not matter if the size, colour, or softness of his stool changes when he eats a new food as long as the child is healthy.

Sections 7.3 and 7.4 are important and it may help you to have a list of the seven rules in them. Here they are.

1. Breast milk is best.
2. Put a new born baby to his mother's breast as soon as possible.
3. Start giving a child porridge when he is six months old.
4. By the time a child is 8 months old, he must be eating much porridge with added protein three times a day.
5. Start the baby on new foods *before* he has had his breast milk. Once he likes a new food give it to him *after* his breast milk.
6. Go on breast-feeding a child as long as possible.
7. Stop breast-feeding slowly.

Feeding a Child From the Age of 8 Months On

7.5 When a child is 8 months old, he should be eating most of the foods that the adults in his family eat, but these foods must be pounded or mashed till they are very soft. A child can eat almost any food if it is made for him in the right way so that he can eat it easily. You can find ways of making these foods in Sections 8.8 to 8.14 in the next chapter.

<p><i>A BABY'S FOOD MUST BE WELL MASHED</i></p>

A child of 8 months should be eating his own special porridge 3 times a day. At least once a day he should eat some protective food, such as mashed dark green leaves or fruit. By the time a child is a year old, he can begin to have some foods that are more hard, solid, and lumpy. He can eat the thin, watery dal soup, but this soup only is not enough because it does not have very much protein. When the child is about 1 year old, he can start eating some of the chappati with dal or

green leaves that the other people in the family eat. He does not have to eat only his porridge.

Although a child is beginning to eat adult food by the time he is one year old, he is still not able to eat as an adult eats. A young child is different from an adult in the way he needs to be fed in these six ways:

1. *A young child needs to be fed many times a day.* This is very important. A 1-year-old child needs at least 3 or 4 meals a day. Many families have only 2 meals, or even 1 meal, a day. This is not enough for the young child, who must have 1 or 2 or even 3 extra meals of porridge with added protein food. This may not seem very easy to poor mothers. Be certain to teach them how they can do this. Section 8.1.

2. *A young child needs his vegetables without spices.* Most children spit out spicy foods. Spicy foods are very hot for small children. The food must be cooked without spices. After a child's share has been taken out, spices can then be added to the food for the other members of the family.

3. *A young child needs his own special plate.* This is so he will be certain to get his part of the food, most important, his part of the dal and vegetable. A young child eats slowly and if he does not have a special plate for himself only, the others in the family may eat more quickly and he will not get enough to eat. He may find that the others have eaten all the dal and vegetables before he has had enough.

<p>A YOUNG CHILD NEEDS A PLATE OF HIS OWN</p>

4. *A young child's food must be well mixed.* Some people think that this is so important that they say, "A good food is a mixed food." This is a good thing to teach to mothers because a mixed food must be a mixture of the staple and some other food. There is a good chance that this other food will be a protein food. In addition, when a child eats his porridge which he likes, he will at the same time get some of the dal or vegetable which he may not like at first.

5. *Food for a very young child needs to be well mashed or at least cut into small pieces.* This needs to be done till he can chew it

easily himself. If he is given food that is big and solid, he may not be able to eat it. If he does get it down, this may give him stomach pains and diarrhoea. Because food that is not small enough is not digested and cannot be absorbed, it is wasted by his body and passes out in the stools. His mother thinks she is giving him meat or beans but he still gets very thin and ill.

6. *A young child needs to be fed.* A young child is bad at feeding himself with his fingers and needs to be fed. At first he needs to be helped, but as he grows, he can learn to feed himself. Thin porridge should be given with a clean cup and spoon. Most adults and grown children eat with their fingers. Porridge that is thicker can be given with the fingers by the mother or another person, but the mother or other person must be certain to wash her hands before feeding the child.

Some non-vegetarian mothers do not give children body-building foods like eggs, meat, and fish. This is sad because these are very good protein foods for young children. Like all foods for young children, they should be well mashed or cut up so that they can be eaten easily.

HELP A YOUNG CHILD TO FEED HIMSELF

A young child will get more food if his family does these things for him:

1. Give him a plate for only himself.
2. Give him enough food on his plate.
3. Be certain his food is well mixed.
4. Help him eat by feeding him with a spoon or your fingers till he can use his fingers well to feed himself.

When Should Breast-feeding End?

7.6 Because mother's milk is such an important way for a child to get protein, a mother should go on breast-feeding her child till he is 18 months or 2 years old. If she wants to go on for more time, she can. A mother must stop breast-feeding slowly. When a

child is very young, he needs to be fed many times in a day, but by the time he is a year old, his mother can breast-feed him in the morning, go out to work, and then breast-feed him again in the evening. If she can, she should breast-feed him in the middle of the day also. When her child is 18 months old, a mother can stop breast-feeding in the morning, so that in the end, she is breast-feeding him only at night.

*BREAST-FEED A CHILD TILL HE IS
18 MONTHS OR 2 YEARS OLD*

Breast-feeding Must Stop Slowly

7.7 This is true for the health of the mother and her child.

For the mother: If the mother of a very young child stops breast-feeding suddenly, her breasts may get heavy with milk and become painful. She may get sore places on them.

For her child: Breast-feeding is very important in a child's life and makes him feel happy. He goes to the breast when he is hungry or when he is ill or when he is sad. If he suddenly cannot do this, he may become very unhappy and may not eat any food at all.

BREAST-FEEDING MUST STOP SLOWLY

Some mothers put hot peppers or the liquid of trees on their breasts when they want to stop breast-feeding. This is a bad thing to do. It is sad for a child who has gotten used to his mother's breast to suddenly find his mouth full of red-hot peppers.

A child should be eating enough porridge and protein food by the time breast-feeding stops. If he is not eating the right amount of these foods when breast-feeding ends, he may not get enough to eat and may become thin and malnourished. He may even die. If he is eating porridge only, without added proteins, when breast-feeding suddenly stops, he will get kwashiorkor. A child should be eating all kinds of foods by the time he is 18 months old. If he is doing this, he will not miss breast-feeding when it slowly ends, and he will not become malnourished.

**A CHILD MUST BE EATING ADULT FOOD WELL
BEFORE HE STOPS BREAST-FEEDING**

Some mothers start bottle-feeding as soon as they stop breast-feeding! This is not necessary and can be dangerous. By the time a child stops breast-feeding, he should be eating at least 3 good protein meals a day and he should be drinking well from a cup. Some mothers do not start to give their children adult food till they stop breast-feeding. This is very bad. A child should be eating adult food for many months before he stops breast-feeding.

Breast-feeding in Pregnancy

7.8 Many women stop breast-feeding as soon as they get pregnant. They do this because they think that the milk from a pregnant mother may become "sour" or bad and may make the baby ill. A mother's breasts make less milk when she is pregnant, but there is nothing wrong with the small amount of milk that they do make.

When a mother finds she is pregnant, she may not be happy and may worry because she thinks she has hurt the child at her breast. She need not worry because she will hurt him only if she suddenly takes him away from her breast and stops him from drinking the protein in her milk. This is what makes him malnourished. But if she goes on breast-feeding, she will not hurt the child at her breast, the new child in her womb, or herself.

**PREGNANT MOTHERS CAN BREAST-FEED
BECAUSE THEIR MILK IS NOT "SOUR" OR BAD**

Though a mother can go on breast-feeding while she is pregnant, she now has three people to feed — herself, the baby sucking at her breast, and the baby growing in her womb. It is easy to see that she will need much extra protein food. In Section 6.1 and Table 6.1 we saw that a woman needs 6 grams more reference protein when she is pregnant and 15 grams more when she is breast-feeding. So, when she

is both pregnant and breast-feeding, she needs 21 grams more reference protein ($6+15=21$) and even bigger amounts of other proteins which are not as good for body-building (Figure 7.3).

Many mothers will not go on breast-feeding when they are pregnant. We should attempt to make them want to go on breast-feeding, but if a mother still wants to stop, make certain she stops slowly. She should breast-feed her child less and less times a day till at the end of a month, she has stopped breast-feeding him at all.

Some mothers stop breast-feeding suddenly when they are pregnant. This may not make the child very happy. One of the first things that a child who is not happy does is to eat less. He may even get kwashiorkor or marasmus. We can see, then, that it is usually good for a young child if the mother keeps on breast-feeding even when she is pregnant again.

A mother who is breast-feeding will probably not become pregnant as quickly as a mother who is not breast-feeding. But breast-feeding is not a very good way for a woman to keep from getting pregnant. There are ways named "family planning" that are good and are so easy and safe that people should be able to get them at every health center. Family planning attempts to make certain that babies are not born very soon after one another. It attempts to keep a mother from becoming pregnant again when she is still breast-feeding. The time between 2 children is named the "birth interval." An interval is space or period of time. A short birth interval, for example, 1 year, is bad for the nutrition of the children and their mother; it is very, very bad if the family is poor and there is not much food to eat. A long birth interval, for example, 3 years, is good. The poorer the family, the longer the birth interval should be. In the poorest families, it should be at least $2\frac{1}{2}$ years.

**A VERY SHORT BIRTH INTERVAL
CAUSES MALNUTRITION**

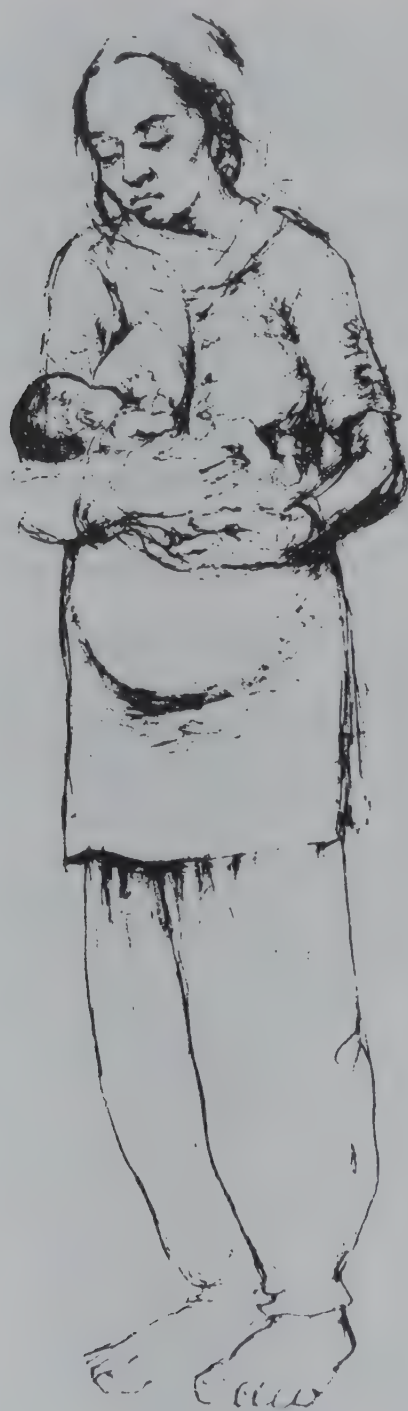


Figure 7.3
A Pregnant Mother Needs Extra Protein & Calories

THINGS TO DO

1. *Plan a meeting on the importance of breast-feeding.* Make a list of ideas you want the mothers to learn. Ask the mothers to talk about their experiences and share their information on breast-feeding. Check to see if all the ideas you listed have been talked about. If not, ask more questions. Give special attention to the importance of good child spacing (family planning) for good breast-feeding and good nutrition.

2. *Role play how you teach a mother to express breast milk and feed a child with a wick.*

FEEDING THE FAMILY:
YOUNG CHILDREN

A Child Needs At Least 3 Meals a Day

8.1 In the last chapter you learned about how important the right nutrition is for a mother who is pregnant or breast-feeding. You read about how very important it is for a mother to go on breast-feeding till her baby is 18 months old. And you learned that a mother should start to give her baby porridge, and then other adult foods, before she stops breast-feeding.

Now is this chapter, we will learn more about feeding a young child. In addition, you will read about how important good nutrition is for the father.

An adult can eat enough food in one meal to keep him all day. A child cannot do this. His stomach is not big enough to get enough food for a whole day in 1 or even 2 meals. *A child needs at least 3 meals a day.* Four meals a day are even better for him. Many families eat a big meal only in the evening. If a child eats only at this meal, he is eating only once a day, and this is not enough. A child must have at least 2 other meals made specially for him. He can be given any of the meals described in Sections 5.5 through 5.11.

A CHILD MUST NOT MISS HIS MEALS

If a child is going to have 3 meals a day, there is much work for a busy mother. The fire must be lit 3 times, water boiled, and porridge made. Some protein food must then be added to the porridge. In addition to the work with the food, more fuel, such as dung or dried grass has to be carried or bought! But, only a small amount of water needs to be boiled, and other children may be able to help the mother. The foods described in Sections 5.5 to 5.11 make it easy to add protein once porridge has been made. Or a child can be given cold food when

there is not enough fuel. This is not as good, but it is better than nothing.

Though one of the most important "blocks in the food-path" in many districts is not enough meals in a day, this "block" is one of the easiest to put right. By the middle of the month many families have no money to buy protein foods. But most families have enough wheat, maize, or rice most of the month, and they can feed their children many times. We must teach them how important this is. The meal that children most miss is breakfast, the morning meal, and families should be helped to understand that their children must be given breakfast every morning.

Some countries have this saying, "Children, like chickens, should always be pecking (eating)." This is good to say to parents when they ask how many times a day they should feed their children.

How Much To Feed Children and The Difficulty of "Bulk"

8.2 In Chapter 6, we saw how much protein (Section 6.1) and how many calories (Section 6.2) a young child needs to grow. We saw in Table 6.1 that a child of 2 years needs about 1.2 g of reference protein and 104 calories each day (Table 6.2) for every kilo he weighs. A healthy 2-year-old child weighs 11.5 kg, so he needs 14 g of reference protein every day ($11.5 \times 1.2 = 14$ g). Since only 55% of maize protein is used for body building, he needs more of maize protein. He will need about 25 gms of maize protein to have enough ($14 \times 100/55 = 25$ g). Because maize is about 8 percent protein, our young child can get the protein he needs in 320g of maize meal ($25\text{g} \times 100/8 = 320\text{g}$ of maize meal).

As for energy food, for calories, he needs about 1200 calories every day ($11.5 \times 104 = 1200$ calories). We say in Table 4.7 that there are 360 calories in 100 g of maize meal. If our child of 2 is to eat these 1200 calories, he must eat about 330 g of maize meal ($100 \text{ g} \times 1200 \div 360 = 330\text{g}$). This is almost the same amount of maize meal that he has to eat to give him the protein he needs. So let us say that he needs 330 g of maize meal to give him the protein and the calories he needs every day.

How much porridge does 330 g of maize meal make? It makes about 2,000 g of porridge. This is 2 kilos, or 4 very big platesful. This

is more than a child of 2 can possibly eat, even if he has 4 meals a day! Because so much porridge has such a small amount of maize meal and nutrients (proteins and calories), we say it is a very “bulky” food (Section 5.3). By this we mean that the food that has the necessary nutrients takes up much space. Wheat and rice porridge have this same “bulky” quality.

A two-year old child needs to eat four large platesful of maize porridge a day if he is to get all the calories and protein he needs —

but this is more than a child can eat,
so what should a mother do?

*She should feed her child often..
She should add protein foods to
his porridge..*

*If she can, she should add
some high calorie food
such as dalda or
cooking oil..*

A TWO-YEAR OLD CHILD

*This child needs 1200 calories
and 14 g of reference protein
each day*

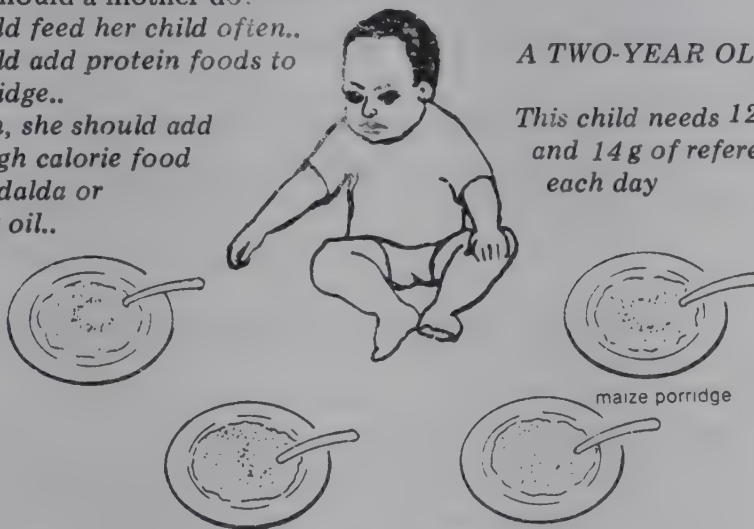


Figure 8.1
Maize Porridge Is a Very Bulky Food

When Cereal Is The Staple Food

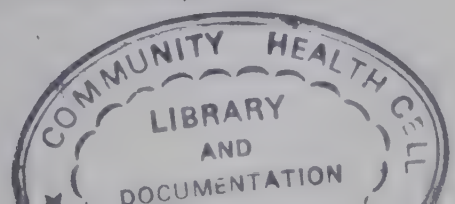
8.3 The common staple foods in India are wheat, maize, rice and bajra. All of them are named *cereals*. What can a mother do to give her child the protein and calories he needs if cereal is to be his staple food?

First, a Mother Feeds Her Child Many Times a Day

8.4 A child has a small stomach and can eat only a small amount of porridge at one meal. If he is to eat as much porridge as he can in a day, he must have at least three, or even better, four meals a day.

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*YOUNG CHILDREN NEED TO BE FED MANY TIMES A DAY**Second, a Mother Must Add Extra Protein Food To Her Child's Porridge*

8.5 She can add groundnuts (which are 23 percent protein), or gram (which is 20 percent protein), or dried skim milk (which is 36 percent protein), or some other protein food. When these foods are cooked with water, they do not swell up as much as cereal meal does and are then said to be less bulky than cereal porridge. They give the same nutrients in a smaller amount of porridge, and the child can get all the protein and calories he needs without having to eat so much porridge.

When we add grams or dals or groundnuts or dried skim milk to porridge, we are mixing proteins. We say in Section 3.7 how good this is, and how mixtures of proteins are better for body-building than one protein only.

Third, She Should Add Some Extra Energy Food To Her Child's Porridge

8.6 Groundnuts are 45 percent fat, and 100 g of groundnuts have 550 calories. So, when a mother adds groundnuts to her child's porridge, she is adding calories as well as protein. Another way to add calories to a child's porridge is to add a spoonful of cooking oil (dalda) or ghee. There are more than 700 calories in 100 g of oil. Oil or ghee has more calories than any other food. But a family must pay much money for oil and many families cannot buy much of it. They must, then, add other foods such as groundnuts.

When To Feed Children?

8.7 It is not important when a child is fed, as long as the child is fed many times a day and has enough of the right food to eat. But it is important that a child have one meal early in the morning. Many mothers give their children chappati and tea in the morning. This is not a good breakfast, but it is

better than nothing. A chappati gives a child only about 120 calories, so you can see that a piece of chappati will not give many of the calories he needs.

Frequently, sleeping children are not fed when they should be. If a child is sleeping when it is time for his food, get him up. He can easily go to sleep again after he has eaten, but if he sleeps through one meal, he may have to wait quite a long time for the next one. *A child needs at least 3 meals a day and must have them all.* If a mother is not at the house or on a journey, she must still see that her children have something to eat.

A child may be hungry between meals. When he wants food, he should be given it. Food that is eaten between meals is named a "snack." Snacks can be groundnuts, cold chappati, or anything that the family may have. The best snacks, such as groundnuts, have protein and calories. "Fizzy drinks" you will remember, are non-foods and they cannot be used as snacks. They have no food value.

Meals For Young Children

Powdered Protein Foods

8.8 The best and easiest foods for a mother to use are powdered protein foods which she can add to her child's porridge. These powdered protein foods are easy to make because many women have a pestle and mortar (*dauri danda* or *hamamdasta*) with which they pound some foods, such as maize or groundnuts. If mothers do not have a pestle and mortar, they usually borrow one.

Figure 8.2

To mill maize, beans, and groundnuts to make food for young children using two stones.



Pounded Groundnuts. These can be pounded in a pestle and mortar and kept in a tin. If ordinary groundnuts are used, they make a powder. This powder can be sieved and any big parts can be made smaller. If there are enough groundnuts, groundnut flour can be made into porridge by itself. This is a very high-protein and high-calories porridge. If the groundnuts are fried first, and then pounded, they make a soft oily butter — groundnut butter.

Pounded fresh groundnuts must be cooked with the porridge, but groundnut butter can be added to porridge after it has been cooked. If the baby is going to get his groundnut butter, the mother may have to hide it from all the others in the family! Roasted groundnuts can be pounded into a powder that tastes good and does not need cooking. Some children, mostly very young ones, get diarrhoea if they are given many groundnuts all at once. If this happens, do not give them groundnuts for two or three weeks, and then give a small amount of them.

Pounded groundnuts and groundnut butter should be kept in a tin and used as needed. *Pounded groundnuts must not get damp*, or they will get mouldy. Do you remember what you read in Section 5.19? Groundnuts that are kept in a damp place may get the poison named aflatoxin.

Pounded Grams and Dals. Grams and dals of any kind can be made into powder and added to the meal from which a child's porridge is made. Because powdered dals need cooking, they must be cooked with the maize meal. Dry dals are hard to pound, and it is easier to add mashed cooked grams to porridge.

Pounded Cashew Nuts. In parts of India, many cashew nuts (*Kaju*) are grown. Cashew nuts grow on trees inside a fruit. Like groundnuts, they have much protein and oil and can be pounded to make a good infant food which can be cooked with porridge.

Pounded Dark Green Leaves. You have read that dark green leaves are 3 percent protein. Palak leaves have even more protein, possibly as much as 7 percent. Dark leaves can be pounded fresh or after they have been dried. When leaves are dried they lose water, and the dry leaves have a large amount of protein and iron. When dried leaves are pounded in a mortar, they make a green powder which can be added to the meal from which an infant's porridge is made. The

leaves are best used with other protein foods. If mothers will get and dry more leaves, their children will have more protein and iron.

Dried Skim Milk

8.9 You read about skim milk in Section 5.13. It is a very good food, but probably only mothers who live in towns will be able to buy it. Sometimes it is given out at clinics. As you have read the best way to use dried skim milk is to add it to a child's porridge.

If dried skim milk is given to a child without any energy food being given at the same time, his body will burn the protein in the milk to give him energy. If dried skim milk is eaten with porridge, the porridge gives calories of energy, and the skim milk protein can be used for body-building.

<p>THE BEST WAY TO USE DRIED SKIM MILK IS TO ADD IT TO PORRIDGE</p>

Easily Obtainable Baby Food

8.10 An easy baby food is made from roasted flour. You can make it by roasting wheat, maize, or millet flour in a thick black iron pot till it turns brown. Mix it around well in the pot to make certain it does not burn and add a small amount of salt and some sugar. To use it, a mother can stir it into milk or water and add some pounded protein food. A child's porridge can be made in this way without lighting fire to boil water every time. This is useful when fuel is scarce.

Using Pounded Protein Foods

8.11 Pounded dried fish, pounded groundnuts, pounded cashew nuts, pounded beans and pounded dark green leaves all need cooking. They should be added to cereal meal before it is cooked, and then they will be cooked with the porridge. After they are cooked, they are easier to *digest* (see Section 3.7). Dried skim milk does not need to be cooked. It can be added to maize or wheat meal before it is cooked or before it is eaten. There will be no lumps if it is well

mixed with maize before it is cooked. If dried skim milk is added to porridge after it is cooked, there may be some white lumps, but these are not important. If a mother does not want these lumps, she should mix the dried skim milk with a small amount of boiled water in a cup. Then she can add this thick liquid milk to the porridge without making any lumps. Once again, dried skim milk should be added to a child's porridge. It should not be given to him in a feeding bottle!

*ADD ONE OR TWO BIG SPOONFUL OF PROTEIN FOOD
TO EVERY PLATE OF PORRIDGE*

Let every mother know how important it is that she add one or two big spoonful of one or more of these protein foods to the maize or wheat meal from which she makes all her child's porridge. Ask her to do this every time she gives her child porridge. Two spoonful of two different pounded proteins are better than two spoonful of the same one. As you have seen, "A good food is a mixed food." And, as you will remember, a young child needs feeding at least three times or four times a day. A young child cannot eat much porridge at once, so a mother needs to make only a small amount of porridge at a time. If she makes more than is necessary, the protein foods she adds to it may be wasted.

Milling Maize With Groundnuts and Beans

8.12 Many villages have a mill which makes wheat and maize into meal or flour. A good food for young children can be made by milling a mixture of maize with gram. If groundnuts are added as well, this makes a mixture that is even better. As we saw in Section 3.7, this mixture is even better because maize, grams and groundnuts are plant proteins, and one helps to make up for the essential amino acids that the others do not have. If the maize, the groundnuts, and the grams are all milled together, mothers do not have to do the pounding themselves. We can see that meal made of maize, gram, and groundnuts is easy to make and also is very good baby food. If a small amount of dried skim milk is added as well, it will be even better.

**MILL MAIZE, GRAMS, AND GROUNDNUTS TOGETHER
TO MAKE CHILDREN'S PORRIDGE**

You can mix 2 parts of maize, 1 part gram, and 1 part groundnuts. The meal is put through the mill two times so that the bits of meal are very small. If only maize and gram are used, the mixture should be 2 parts maize and 1 part gram. These are "rich" mixtures. If gram and groundnuts are scarce, the mix can be made with more maize.

These are good foods for young children, and every village should attempt to make them. They can be made with a pestle and mortar, but it is much work. Millers may not like hard grams in their machines, but you should attempt to make them understand how very important it is for the village that they make these "rich" meals.

Special infant foods in tins. In some shops, it is possible to buy tins of special foods for infants or young children. These boxes or tins of special infant foods are mixtures of powdered milk with some carbohydrate, like wheat flour. They are good foods for children, but they are not as cheap as a mixture of dried skim milk and wheat meal would be if you bought these things and made the mixture yourself. Help every mother to see how good it is to make her own infant foods in the ways written about here. Attempt to make her understand why it is not as good to buy the infant foods that are not at all cheap that some shopkeepers will want to get her to buy.

**INFANT FOODS FROM SHOPS ARE NOT A CHEAP WAY
TO FEED CHILDREN**

More Foods for Infants

8.13 Here are some more infant foods that a mother may want to use. Teach her to use the foods that she is happy with and leave the other foods for other mothers.

Churi (mashed chappati) with dal. Cook some dal till they are soft. Mash them with a spoon, and mix some of these soft, mashed dal into the child's churi. In some villages, dal porridge is thought to be a good food for old people without any teeth. In addition, it is a

good food for young children.

Churi with hard boiled egg. Boil an egg till it is hard. Then take off the shell and cut the egg into very small bits. If the egg is put into cold water as soon as it has been boiled, the shell will come off easily. Add this cut up egg to the child's churi.

Churi with fresh milk. The best way of making this is to add milk and some sugar and oil to mashed chappati.

Churi with egg. Make the child's churi. While it is still hot, add a raw egg, an egg which has not been cooked at all. Mix the egg well into the porridge. The heat of the porridge will cook the egg. Most children like this churi with egg.

Milk with egg. An egg can be well mixed into milk. It is easier to do this if the egg is broken by itself first, and then the milk added to it. This is a very good food. The egg is not cooked but is eaten raw. We should remember that a raw egg is not poison as is sometimes thought and a "fertile" egg from a hen that has been running with a cock is as good as an egg from a hen that has not been with a cock.

Mashed potato with milk. Boil a potato with skin, take the skin off after cooling, mash with a spoon well, adding milk with it until it is smooth.

Mashed potato with egg. Boil an egg in shell till it is hard. At the same time, boil a potato in skin. Take the shell off the egg and skin off the potato, then mix them together and mash well with a spoon.

Mashed potato and pounded groundnuts. Add some cooked pounded groundnuts to mashed potato.

Churi with minced meat. A mother may be able to buy minced meat for a child, or she can cut meat with a knife. Soft boiled meat can be scraped (rubbed) with a knife, and this very soft meat from the knife can then be added to a child's porridge. How the meat is cooked does not matter. What is important is that it must be given to a child in very, very small bits.

Churi with fish. Add some boiled fish to the child's porridge. Make certain you take out the bones first.

Dalia. Take 1 cup of powdered wheat and 2 cups of water and boil till it is soft. Add 2 cups of fresh milk and 3 *tablespoons* of sugar. Mix it all together well.

Suji. Roast 1 cup of suji in a hot pan till it is light brown. Then add 2 cups of milk and 2 *teaspoons* of sugar. Mix it till it is almost solid and not liquid.

Halwa. Roast suji as above. Add one-half ($\frac{1}{2}$) cup of oil, one-half ($\frac{1}{2}$) cup of sugar, and one-quarter ($\frac{1}{4}$) cup of skim milk powder. This is a very good food. It has many calories from the oil and much protein from the milk powder.

Khbir. Boil 1 cup of rice in 4 cups of water till it is soft. Then add 2 cups of milk and 2 *teaspoons* of sugar. Keep on mixing till it is well mixed and soft.

Khichri. Mix 3 parts (cups) of rice, 1 part (cup) of pulses (moongi dahl in the shell is best) and 12 parts (cups) of water. Let this all cook on a low fire for 1 to 2 hours till it forms a paste.

Protective Foods. A young child can have boiled green vegetables with any of these meals. He can have mashed papaya, ripe mango, or banana. By the time he is 10 months old, he must be having these protective foods every day.

A YOUNG CHILD NEEDS SOME PROTECTIVE FOOD
EVERY DAY

Some other foods. A small child can eat most foods, but he should not be given hot, peppery foods.

Because animal protein of any kind is probably scarce, the best way to use it is to mix it with vegetable proteins and give a child at least a small amount of animal protein with every meal. If this is not possible, a child should have a small amount of animal protein at least

once a day. Attempt to make every mother understand how important it is for her to give her children some animal protein every day, and certainly every time she buys it from the market.

*WHEN TRAVELLING,
TAKE YOUR CHILD'S FOOD FOR THE JOURNEY*

Meals To Be Careful About

8.14 Some meals are not as good as they should be. Here are some to be careful about.

Churi with ghee. This can be a good food for a child because ghee has many calories in a small bulk and a child needs many calories. But ghee does not have any body-building protein. If ghee is added to churi, some protein food must be added as well. Churi with ghee is good, but it is not enough by itself.

Churi with sugar. Sugar can be added to porridge and it will give the child some calories, but ghee or dalda is better. Once again, it is not enough to add sugar to churi; protein foods must be added as well.

How Should a Working Mother Feed Her Young Child?

8.15 A poor village mother works for long hours in the field at harvest time. She has to cut grass for her own buffaloes and cows as well as for the animals of the farmer. Because of this, she may be away from her home for many hours and her small children are usually cared for by a brother or sister who is older, or a grandparent. You should teach the mother who goes out to work that she should leave enough cold porridge and milk to feed her small child and the brother or sister who is caring for him. Some mothers attempt to do this, but leave only enough for the baby, and then the grown child who is hungry may eat most of it. Sometimes a grandparent can be taught how to care for and feed the baby while the mother is at work.

Some mothers have jobs in schools, offices, and shops, and want to go to work as soon as their baby is born. What should such a mother do? How can she stay away from bottle-feeding? If possible, she

should attempt to breast-feed the child when an aya or person in the family brings him to her at work and then takes him home again. In some cities, the mother may be able to find a day care center or even hire a full-time aya. Day care centers are places where a mother can take her young children and where there is someone to care for all the children. Offices and factories which have many women workers should attempt to set up a day care center for the children of the workers.

*A MOTHER SHOULD NOT STOP BREAST-FEEDING
WHEN SHE GOES TO WORK*

A working mother should breast-feed her young child early in the morning before work starts, in the evening when work is ended, and again late at night. In working hours, she needs to breast-feed him only twice, in the morning tea break and again at lunch time. This is certainly best for her baby. The person she works for may not like it, but he will probably not mind very much. Village mothers are not ashamed to breast-feed their babies at work and town mothers who work in offices should not be ashamed to breast-feed their babies. Breast-feeding is the best way to feed children and women should not be ashamed about it. (Figure 8.3)

If a mother cannot take her child with her, she should keep on breast-feeding him before she goes to work and in the night. She should not stop breast-feeding. While she is at work, she must see that someone feeds him by cup-and-spoon, and not with a feeding bottle. The best person to do this will probably be another mother or grandparent who is staying at home. When a mother goes to work, she should leave the things ready for the 3 feeds that her child will need. And she should make certain that the person who is caring for her child can make up a safe cup-and-spoon feed.



Figure 8.3
How Should a Working Mother
Care For Her Young Child ?

THINGS TO DO

1. *Cooking for children.*

Attempt to make most of the foods for young children that you read about here. These are the most important meals that you can learn to make. At another time you may be able to give them to your own children and you can teach other people how to make them. Is there a pestle and mortar? If they are used in the district, are there any grinding stones? You should use the same kind of stoves (chula) that are used in village homes.

2. *Make a pot of porridge which has to give about 1200 calories.*

We saw in Section 8.2 that one of the difficulties in feeding young children is the large bulk of porridge. Test this for yourself. Make thin porridge for a child out of 360g of wheat meal. This would give a 2-year-old child the 1200 calories he needs. Do you think he could eat it all?

Now make 1200 calories of suji porridge with oil and sugar. Can a baby eat that amount? Can a 2-year-old child eat that amount?

CHAPTER 9

FEEDING THE FAMILY: SCHOOL CHILDREN AND FATHERS

Feeding the School Child

Breakfast

9.1 Most days children have to leave home for school very early in the morning and it is not easy to light a fire and cook breakfast for them before they go. So we must not be surprised when some children come to school without any breakfast. This is very bad because a hungry child does not learn well. And a hungry child will probably not do as well on his exams as a well-fed child.

A GOOD BREAKFAST IS NEEDED FOR GOOD WORK

A child who is going to learn well must be well fed. A school child needs breakfast before he goes to school. In addition, he needs to take some food with him to eat for lunch in the middle of the day. Many parents do not have breakfast themselves, so they do not think that their children need breakfast. But school children are growing and need many calories for their walk to school and their work at school. Even parents would be able to work harder if they had breakfast every morning.

*SCHOOL CHILDREN NEED BREAKFAST
AND A MEAL IN THE MIDDLE OF THE DAY*

Foods To Take To School

9.2 Every school child should take some food with him to eat in the middle of the day. You should ask every mother to

give her children food to take to school. If they give them money, the children may buy fizzy drinks which are non-foods. Fizzy drinks should not be sold near a school, and if children have money to buy things, shops should be asked to sell fruits or milk and not fizzy drinks.

Here are some of the foods a child can take to school. You can attempt to think of other foods to add to this list.

Fresh foods:

milk, tomato, pineapple, banana, mango

Simple cold cooked foods:

sweet potato, maize cob, hard boiled egg, roasted groundnuts, wheat, maize or millet, chappati, and chappati with groundnut butter

Cold cooked meals:

cooked chappati and beans, chappati with vegetables, maize with vegetables, chappati and thick dal

A child's school meal should be balanced. This means that it should have some energy-giving staple food, some body-building protein, and some protective food. If a mother cannot give her child a well balanced meal, even only one part of it is better than nothing. *Every child should be sent to school with something to eat in the middle of the day.*

The food should be well packed in a clean tin, a clean banana leaf, a clean plastic bag, or clean paper so that it will not go bad or be lost on the long walk to school.

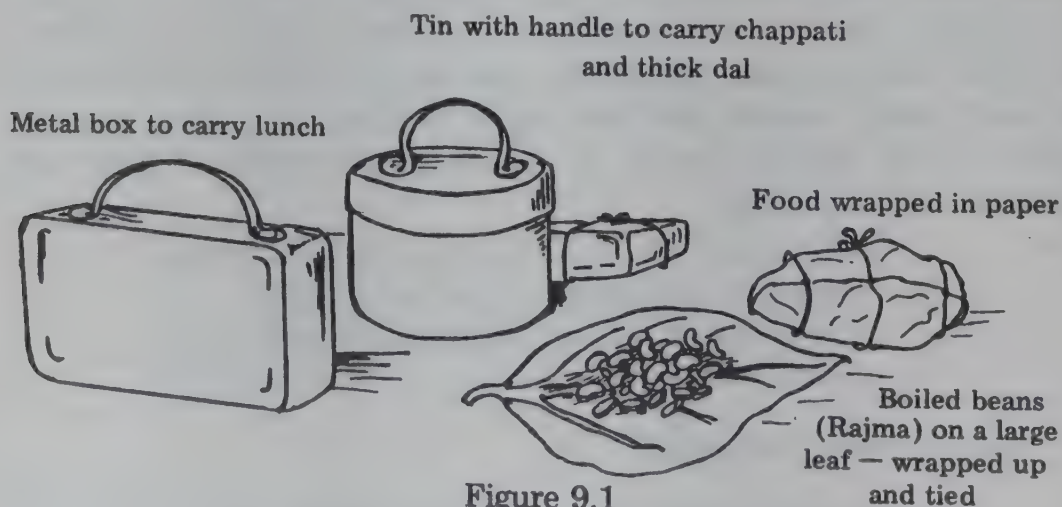


Figure 9.1

Ways To Pack Food For School

Best of all is to pack it in a lunch box. If a child has one of these lunch boxes, other children in the school may ask their parents to give them one. If you cannot get these lunch boxes in the shops, ask the shopkeeper to get them for you.

SEND YOUR CHILD TO SCHOOL WITH A LUNCH BOX OF FOOD

In many schools children want other children to give them part of their food. A child who does not give his food to other children may find that he has no friends. But, if he does give his food to his friends, he may find that he does not have much for himself. Because of this, every child must take some food to school. Teachers should attempt to make the parents understand why they should send all children to school with food.

Every school child should eat a meal in the evening.

9.3 Sometimes a school child eats only after the adult members of the family have eaten. He may get only what his father has not eaten. This is not good. School children must be properly fed in the evening, even if they have to eat by themselves.

Children need extra protein and calories at puberty.

9.4 In other parts of this book, much has been written about people's food needs at special times of their lives. You have read how young children and pregnant and breast-feeding mothers need much protein food. There is one other time we must not forget. This is the time of adolescence, or puberty, when boys become men and girls become women. Boys and girls grow very fast at this time and need much food. The child between eleven (11) and thirteen (13) years who keeps saying he is hungry is not asking for more than his part of the family's food. He is growing very fast and needs more food at this time.

Feeding a Sick Child

9.5 We have read how underweight children can die from measles or some other diseases which do not make healthy children

die. We saw that an underweight child dies because his body is not strong and healthy enough to fight the micro-organisms that are making him ill. We learned that the way to keep so many children from dying of diseases like measles was to make certain that they were well fed and well nourished before they get ill.

In the same way, a child must be well nourished when he gets sick. A child's body needs much food, mostly protein food, so that it is strong enough to fight the disease micro-organisms that are making him very ill. An ill child's body is being broken down more quickly than the body of a healthy child. If he is to become healthy again, he must be given the extra food that his body needs to repair itself.

Milk is the best food for a child who is ill, and mother's milk is the best food for a baby who is ill. When a baby is ill, his mother should not stop breast-feeding him. Frequently mother's milk is the best medicine that an ill baby can get.

When an older child is sick, his mother must attempt to feed him even when he does not want to eat. Because he may not like his usual food, she can make him something special that he likes. Frequently an ill child will eat a food, such as porridge and milk or dalia which is more for babies. A mother should attempt to give him some protein foods, such as eggs or milk.

Measles

9.6 A child with measles needs to be very, very well fed. This is even more important if he is underweight because underweight children may get kwashiorkor when they get measles. Because measles makes a child's mouth hurt so that he does not want to eat, he should be given soft foods that he likes and that are easy to eat. In addition, measles may harm a child's eyes; it can be even more harmful if he does not get enough Vitamin A. Because of this, he should be given much food that has this vitamin — papaya, mangoes, tomatoes, carrots, or eggs. Papayas, mangoes, and tomatoes can be squashed into a thick juice which then can easily be given to a sick child. Most important of all, measles harms a child's stomach. This gives him diarrhoea and he does not absorb food well. He needs to be very well fed. Usually, dalia will be taken and eaten by a child ill with measles.

AN ILL CHILD NEEDS MUCH PROTEIN FOOD

Diarrhoea

9.7 Many children have diarrhoea, and many of them die.

Diarrhoea can be caused by many things, but two of the most common causes are malnutrition and infection, which frequently happen together. By infection we mean bad or unhealthy (not healthy) micro-organisms getting into a child and making him ill. Micro-organisms sometimes grow in a child's gut and cause diarrhoea. These bad micro-organisms usually get into his stomach through his food or his drinking water. They can get into the food or drinking water from other people. This is why it is so important that human faeces do not get into drinking water or into food. We saw in Chapter 4 how people could keep this from happening.

But how does malnutrition give a child diarrhoea? Food is digested in the stomach by special things named enzymes which are themselves proteins which the body puts into the stomach. If the body is malnourished and does not have essential amino acids, it cannot make these digestive enzymes as it should. Malnutrition is bad for the stomach and the body in other ways. If some enzymes are not in the stomach, food is not digested and absorbed well, and this causes diarrhoea. Bad micro-organisms grow more easily in the stomach and body of a child, and this helps to cause diarrhoea. In this way we see that malnutrition causes diarrhoea.

The vicious circle of malnutrition and infection

9.8 Because diarrhoea causes malnutrition by preventing food from being digested and absorbed properly, we can say that diarrhoea helps to cause malnutrition and malnutrition helps to cause diarrhoea. When two bad things help to cause one another, we say they make a "vicious circle." This is the vicious circle of malnutrition and diarrhoea (see Figure 9.2 on page 6).

We have seen that diarrhoea is an infection, and that it causes malnutrition. Other infections can help to cause malnutrition. They do this by causing a child's body to be broken down quicker than

Malnutrition makes

Infection worse

— and —

Infection makes

Malnutrition worse

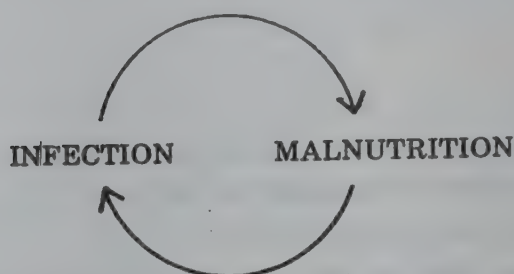


Figure 9.2 — A Vicious Circle

usual. There is much protein lost from the body. Measles, for example, makes a child's mouth painful and it may give him a special kind of diarrhoea. In addition to diarrhoea, other infections such as measles and tuberculosis (TB) are made worse by malnutrition.

MALNUTRITION MAKES INFECTIONS WORSE AND INFECTIONS MAKE MALNUTRITION WORSE

The only way to break the vicious circle caused by malnutrition and infection, specially the one caused by malnutrition and diarrhoea, is to feed a child well and to give him enough calories and protein foods. This will give him the best possible chance to digest and absorb enough nutrients to cure his malnutrition and his diarrhoea. This is not easy because giving a child more food may make his diarrhoea even worse for a time before it stops. He may have more stools when he is given more food, but even so, he will still be getting well. A child must be given this extra food because this is the only way in which he will get healthy again. He may take many weeks to get well, so do not stop giving the child enough food to eat.

Because a person usually has the diarrhoea of malnutrition for some weeks or months, we say the illness is *chronic*. With a chronic disease a person is ill for a long time and dies or gets well very, very slowly. The diarrhoea of malnutrition is usually not very bad and a child may have only three or four stools a day. Food is much more

PROTEIN FOOD IS THE BEST "MEDICINE" FOR
CHRONIC DIARRHOEA IN UNDERWEIGHT CHILDREN

Feeding a Child With Diarrhoea

Diarrhoea and Dehydration

9.9 When a child gets diarrhoea his body loses water in his stools. Though other things are lost, it is the water that is most important. When a child dies from diarrhoea, he dies usually because his body has become dry and does not have enough water in it. When a child has lost water in this way, we say he is *dehydrated*. Diarrhoea may come on very quickly and a child may die in days or even hours from *acute* dehydration. When a person has an acute disease, he is ill only a short time and he dies or he gets well very quickly.

When a child loses water in his diarrhoea stools and becomes dehydrated, this water must be put back. When it is put back, most children get well quickly. In caring for a child with diarrhoea, the most important thing to do is to put water back in the body. The easiest way to do this is to give him much water to drink by cup or spoon. He may not want to drink or eat for a time, *but his mother should go on making him drink small amounts of water many, many times a day.*

Salt-and-sugar Water

9.10 Because the body loses salt as well as water in diarrhoea stools, the mother should add one-quarter ($\frac{1}{4}$) of a teaspoon of salt (not more!) to every cup of water she gives her child. In addition she should add two (2) teaspoonsful of sugar to every cup of water. Remember, only a *very small amount of salt* is needed in this salt-and-sugar water, one-quarter ($\frac{1}{4}$) of a teaspoon to a cup of water. It is usually easier to prepare a bottle or jar full of this sugar and salt water at a time than to prepare one cup at a time. To do this you add one teaspoon of salt and 6 teaspoons of sugar or gur to one litre (1 kilo) or 4 cups of boiled water and mix it well before giving to the child.

Make sure the water is cooled after. More salt or more sugar than this will not help the child. It may make him more ill because he will vomit (be sick to his stomach). It may help a mother to know how much salt to add if you teach her that she should add as much as she can *pinch in her thumb and the ends of two fingers*. Let her see what you mean by this. Most children soon get well again if they are given much of this salt-and-sugar water as soon as they start to get diarrhoea.

*SALT-AND-SUGAR WATER IS THE BEST "MEDICINE"
FOR ACUTE DIARRHOEA*

Rehydration of a Child With Diarrhoea

9.11 Many children with diarrhoea will come to the health centre, and it is important to treat them properly. They must start with oral (by mouth) rehydration (make full of water) at once, before they go home. It is no good to say to the mother of a dehydrated child that she should give him much fluid when she gets home. The child is dehydrated now and he needs his fluids. He may have a long walk home and he may be more ill by the time he gets there. And he could become more ill because his mother may not understand what she has to do if she does not have help to do it herself in the health centre. She must be taught how to start the rehydration of her child in the health centre before she goes home.

The best way to do this is to have a "diarrhoea corner" in a quiet part of the health centre where two or three mothers can sit and rehydrate their children with salt-and-sugar water from a cup and spoon. Give the mothers a cup full of water and a spoon. Then put down in front of them a bowl of sugar and a bowl of salt. Let them take two spoonsful of sugar and a "three-finger pinch" of salt to add to the water, and let them make the mixture themselves. Then they will know how to do it when they get home. Many dehydrated children feel a great need to drink something, and it is very good to see them feel better while you watch them taking their salt-and-sugar water. Make certain the mothers of all dehydrated children and of all children with diarrhoea know how to give these children the salt-and-sugar water. It may be necessary to give a child medicine, but salt-and-sugar water

is usually more important and, many times, is all that is needed. If the child can not drink from a spoon and is very sick, you can try giving him this salt-and-sugar water from a plastic medicine dropper, drop by drop.

**GIVE A CHILD SALT-AND-SUGAR WATER
AS SOON AS HIS DIARRHOEA STARTS**

Not every dehydrated child can be made well again with only salt-and-sugar water by mouth. If he is vomiting and is having diarrhoea salt-and-sugar water by mouth may not be enough. When a child is very dehydrated, his eyes start to go back into his head and if you pinch up (pick up between your thumb and finger) the skin over his stomach, it may stay pinched up for a while and not become smooth again very quickly. His mouth may be very dry. These are signs that his body needs much water and that he is seriously dehydrated.

A seriously dehydrated child needs more salt-and-sugar water than he can get by mouth. This child needs water going straight into his body through a vein or blood vessel. The kind of bottle and tube that are used to put water straight into the child's body is called a "drip." If a child is given a drip before his dehydration is very, very bad, he soon gets well again. Many mothers bring children to the hospital when the dehydration is very, very bad and then even a drip cannot save the child's life. These mothers have come to think that a child who is given a drip is going to die, so they take their children from the hospital. If a child with diarrhoea is going to live, he must be given enough water to drink as soon as he starts to get diarrhoea, and he must be brought to a health centre or hospital before his dehydration is very bad. One of the most useful things we can do is to *teach every mother to give her child salt-and-sugar water as soon as he has a few loose stools and starts to get diarrhoea*. If every mother did this, not many children would need to go to the hospital and almost none would die from dehydration. When a child with dehydration comes to a clinic, it might be good to give him CMRT salt mixture (see Child Care Manual), not the simple salt-and-sugar water.

Drugs and medicines may be needed for curing diarrhoea, but most children can be cured with big amounts of salt-and-sugar water

and good food. This works very well with children who are underweight and have chronic diarrhoea.

Breast Feeding and Diarrhoea

9.12 As you will read in the next chapter, many bottle-fed children get diarrhoea. They get it very seriously and may die. A breast-fed child may get diarrhoea sometimes, but he does not get diarrhoea because he is breast-fed. A breast-fed child gets diarrhoea because micro-organisms get into his body in other ways. Breast-feeding itself does not ever cause diarrhoea. When a breast-fed child has diarrhoea, his mother must go on breast-feeding him. The worst thing that she can do is to stop breast-feeding him and start bottle-feeding. If she stops breast-feeding him and giving him liquids, he may die. A breast-fed baby does not get diarrhoea very seriously. When he does, he will get well again if his mother gives him salt-and-sugar water.

Other Foods and Diarrhoea

9.13 A mother may say that some other foods, such as bajra or dal, give her children diarrhoea. Her children may get diarrhoea, but it is usually caused by germs in dirty food or water that has not been boiled. Or it may be caused by bottle-feeding that is not done properly. The only time that good, clean, well-cooked food may cause diarrhoea is when a big amount is given to a young baby who is not used to it. Give new foods to a baby a very small amount at a time so that he gets used to them and does not get diarrhoea. If gram has thick skins, it may not be easy to digest, so take off the skins after the gram has been left in water to make it soft. It is sad and dangerous if a mother stops giving her children good protein foods, such as gram, because she fears diarrhoea.

If a mother does not believe you when you say that foods do not cause diarrhoea, make some food and give it to some of the babies at the clinic. Next month, when this mother comes again, let her see the babies who have had this food and make her know how they have not had any diarrhoea. The babies in the clinic will be a good example. Or you can ask the mother if her children have had diarrhoea. She will probably say that they have not had diarrhoea. In time, these mothers may come to believe what you say.

Lactose and Diarrhoea

9.14 We learned in Chapter 5 that dried skim milk is 51 percent carbohydrate named *milk sugar* or *lactose*. This means that it is about half lactose (Lactose needs a special enzyme called lactase to digest it). Some children, usually malnourished ones, who are past the breast feeding age may not have enough of the right enzyme in their stomachs to digest all this lactose. This lactose which is not digested may give a child diarrhoea, if he is given big quantities such as 2 or 3 glasses of milk (natural milk or made from dried skim milk powder) he may get belly aches and diarrhoea. If a mother says that her children get diarrhoea with milk, she may be right. If she is using dried skim milk, or natural milk, ask her to add less milk to her children's porridge and to add other protein foods, such as grams or ground-nuts, as well. In this way she is adding some animal protein to a mixture of plant proteins and this is very good. It uses foods in the best way for body-building, and it will probably not cause diarrhoea. Also ask her to try giving small amounts many times instead of giving a large amount at one time.

Feeding Father

9.15 Most of this chapter has been about feeding children, but we must not forget the fathers who are the workers. If a country is to develop and go forward, all the workers in farms, factories, and offices need to work well. Farms grow good foods and factories make or produce the things that everyone needs, **only** if the workers can work well.

As a child needs a good breakfast before he goes to school, so a worker needs a good breakfast before he goes to work, and he needs a good meal in the middle of the day. A bottle of fizzy drink is not enough! Most workers do not live close enough to their work to be able to go home for lunch. They do not have enough time and they would have to pay much money for the transport. They must, then, take food with them or get food at work. Any of the meals for school children written about in Section 9.2 can be taken by fathers also when they go to work.

Productivity

9.16 Growing crops and making things in factories is named “productivity.” Productivity needs hard work, and hard work needs the right food. You will remember from Chapter 6 that a man who is working hard with his hands needs many extra calories of energy food to give him the energy that he needs for his work. Not enough energy food is one of the reasons why many workers do not and cannot work as hard as they could. It is an important cause of low productivity, and this low productivity makes the development of a country slower than it should be.

*HIGH PRODUCTIVITY NEEDS HARD WORK!
HARD WORK NEEDS ENERGY FOOD!*

Eating While At Work

9.17 It is difficult to teach workers to take food with them to work, and not many do so. Many workers have no breakfast at all. But a well-fed worker has a higher productivity than a poorly fed one, or in other words, he is able to work harder and produce more than a hungry or underfed worker. A well-fed worker will probably not have as many accidents and be sick as many times as a badly-fed worker. This is so important that it is usually wise for a factory to give its workers free food. For example, one sugar farm needed workers for 6 months a year to cut the sugar cane. It took thin, badly-nourished workers from the village and fed them good meals of chappati and dals, with meat one time a week. At the end of three weeks, these workers were cutting 2 times as much cane as they did when they first came. When they went home at the end of the cane-cutting season, they were heavier, stronger and healthier than they had been at the beginning.

Many other factories have found that it is wise and profitable to feed their workers. A place where workers eat is named a “canteen,” and all workers need a canteen. Factories and offices should have them and workers’ unions should ask for them. Canteen meals need to be cheap enough so that a worker getting a very low payment can buy something good to eat there. Many factories help their workers by

paying for part of the meal. If some factories are not big enough to be able to run their own canteen, they can join together and run one big kitchen. The food is brought to the workers at all the factories. Sometimes food sellers can be asked to visit a factory and sell food. It is so important to feed workers that some countries have laws about having canteens in factories, as they have laws about safety in factories.

<i>EVERY WORKER NEEDS A CANTEEN</i>

THINGS TO DO

1. *Learn to teach families in the Under-Fives Clinics how to make the meals written about in Section 9.2. What are the best foods for a child in your town or village to take to school?*
2. *Teach the mother of a child with diarrhoea how to make salt-and-sugar water and how to give it to her child with a cup and spoon. Ask her to make it in front of you at her own home.*
3. *Visit a factory or farm and find out how the workers are fed.*
4. *Make a food collection as in Chapter 4: "Things To Do." Ask members of the class which foods they would give to a young child whose mother did not have enough breast milk (Section 7.2), to a sick child (Section 9.5), to a child with diarrhoea (Section 9.9 to 9.14), and to a child to take to school for lunch (Section 9.2).*

ARTIFICIAL FEEDING

In Chapter 9 you read about what a good food breast milk is for babies and how important it is that a mother should breast feed her children. Breast feeding is the best way for a mother to feed her baby because it is the most natural way. "Artificial" means "not natural;" artificial feeding or bottle feeding is, then, not the best way to feed a baby. This chapter teaches you how dangerous bottle feeding can be, and how difficult it is for a village mother to make a good, clean, safe bottle feed.

Bottle feeding is one of the worst things that has come to India from Europe and America. You should attempt to make mothers understand why they should breast feed their children. Some people feel so strongly about the dangers of bottle feeding that they think a book of this kind should not say anything about it, but we will talk about it because you should understand it. We hope that, when you know how bottle feeding should be done, you will understand more easily why it goes wrong so frequently. In addition, some mothers will bottle feed their children even if we attempt to teach them not to, and some of them may have started using feeding bottles even before you see them. All you may be able to do is to teach them how to use the bottled milk in a good way so that the bottle feeding is not as dangerous to the children. There are not many mothers, possibly one in a hundred, who are not able at all to breast feed their children and will have to feed them artificially. When a mother dies in childbirth, her baby may need artificial feeding because a person in the family cannot be found to breast feed the child. It is important that you know all about bottle feeding so that you can help these people.

Why Bottle Feeding Is So Bad

Bottle feeding is not as good as breast feeding for four important

reasons:

Bottle Feeding is Dangerous

10.1 It is dangerous because it makes babies ill and frequently makes them die.

It does this in two ways:

(1) *Starvation.* A young baby needs much milk, but mothers must pay money for milk and many village mothers can buy only a small amount of milk for the whole family. City mothers may want to buy powdered milk and this takes even more money. Frequently a mother does not put enough milk powder in the bottle and adds much water or tea. Then her baby does not get enough food and becomes thin and marasmic. Marasmus can be caused by a child not getting enough milk in his bottle.

Mothers sometimes make a bottle feed by putting a small amount of powdered milk in water till it looks a bit white like milk. Because they want to use the tin of milk for a long time, they put less of the milk into every bottle. They do not understand that a bottle of milk made this way is nothing like fresh milk or breast milk. There is much less food in thin, weak, watery milk of this kind than there is in properly made milk. It is not unusual that many bottle fed babies die.

(2) *Infection.* Micro-organisms ("germs") grow in milk and they grow quickly in warm, dirty feeding bottles. If even a small amount of milk is in a feeding bottle after a feed, micro-organisms will grow in it. When more milk is put in the bottle, the "germs" will grow in this milk. If a baby is given a feed of dirty milk with many micro-organisms in it, he will get diarrhoea and may die.

When harmful micro-organisms get into a child and grow in him, we say he is "infected" or has an "infection." To stop infection before it starts, we have to make certain that there are no harmful micro-organisms in a feeding bottle or on a cup and spoon before it is used. The best and most common way of doing this is to wash bottles or cups in boiling water to kill the harmful micro-organisms.

We can now understand why many bottle feeds do not have enough milk so that the baby starves, and why there can be so many micro-organisms that he gets diarrhoea. Starvation and diarrhoea are

dangerous, but starvation is usually more common and is the more serious danger.

Safe Bottle Feeding Needs Much Water and Fuel

10.2 A feeding bottle is used many times a day. Every time it is used, it must be washed in water and boiled to make certain that the micro-organisms inside it are dead. When a mother does this, we say she “sterilizes” the bottle. Mothers must have enough boiling water to do this. Many mothers do not have enough water or enough fuel to wash and boil the feeding bottles properly. So often they wash bottles in very little cold water, which does not kill the micro-organisms. If the baby drinks milk from this bottle he becomes ill.

Safe Bottle Feeding Is Not Cheap

10.3 It is not cheap because a mother must use much milk and she must use fuel to boil the bottle. If a mother does not have enough milk and fuel, she must not bottle feed her child!

Breast feeding is much cheaper than artificial feeding, but it does take some money because a breast feeding mother should buy and eat some extra food herself. You will remember from Section 6.2 that she needs extra protein food every day, about 16 g of reference protein, or 27 g of cereal protein.

Safe Bottle Feeding Takes Time

10.4 Breast milk is ready for a baby at any time, but a bottle feed takes time to make.

A Feeding Bottle Is Not An “Artificial Breast!”

10.5 A mother’s breast is ready at all times. Her child can feed as long as he likes, when he likes. Her child can feed as long and as many times as he likes, when he likes. This is one of the things that makes breast feeding so easy and safe. But when a mother starts bottle feeding, she may use a feeding bottle in the same way. She may think it is an “artificial breast” and give it to her child to suck at any time.

The mother may fill the bottle sometimes, but she may forget to empty it and wash it. If a mother is to use a feeding bottle, she has to

use it in quite a different way from her breasts. She must sterilize her bottle, make the milk for the feeding, feed her child, and throw out the milk that the child does not drink or give it to some other person in the family. She must then wash the feeding bottle. The next time the child wants to eat, she must do the same thing again! All this must happen 5 times a day. The mother can not let a half finished bottle stand and feed her child again the same milk.

A FEEDING BOTTLE MUST BE CLEANED AFTER EVERY FEEDING

It is most important that a mother does not keep some milk in a feeding bottle from one feed to the next. If a child does not drink some milk, it must be thrown out, or some other person may drink it at that time. But the mother must make fresh milk the next time her child is hungry. This is one of the things which takes so much time and money and makes bottle feeding so difficult.

When Breast Feeding Cannot Be Done

10.6 We have seen how important it is that a mother breast feed her children if she possibly can. But what are we going to do for the child who has no mother? And what are we going to do for the one mother in every 100 who cannot breast feed her child because she is very ill or because her breasts have some disease? If another woman in the family can breast feed the child, it is a very good thing. But if this woman has another child who is breast feeding, she will not be able to give the full amount to the two children. Many times the mother's mother or the mother's sister or another woman can make some milk for the child even if she has no young child. If the woman cares enough for the child to let him suck at her breasts many times a day, some milk will start to come in the breasts after the child has sucked for a number of days. However, usually the woman cannot make enough milk so that the child can have all he needs. The child will need something extra and will have to have more food.

What are we going to do for the poor mother who has to work many hours in the fields and has to leave her baby at home? She should give her child as much breast milk as she can. She may be able

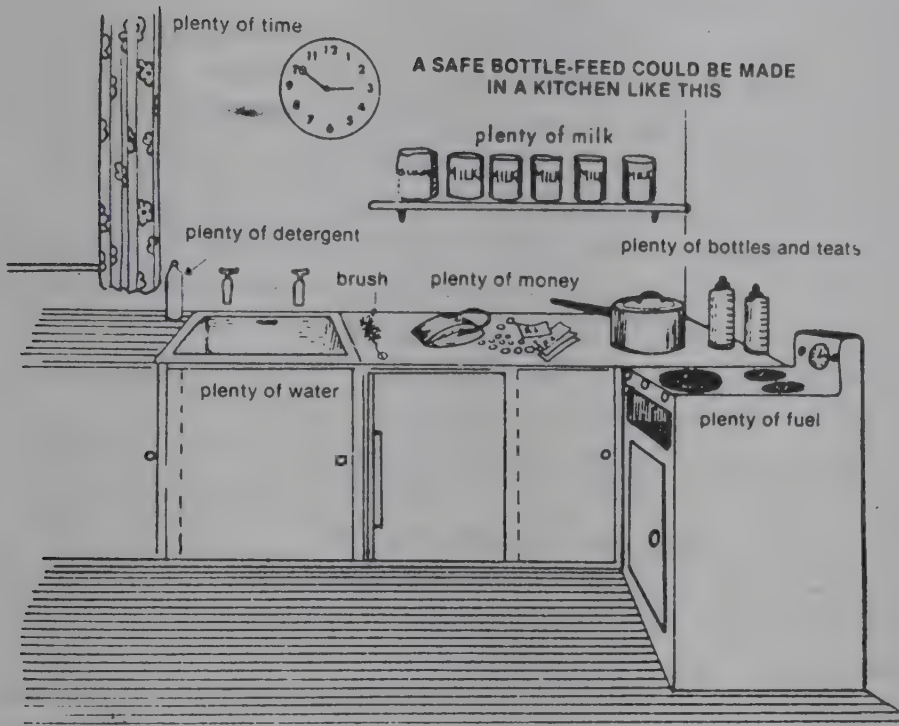


Figure 10.1 — Safe Bottle Feeding Is Possible Only in a Modern Kitchen



Figure 10.2 — In This Home, Safe Bottle Feeding Is Not Possible

to breast feed her child at night and in the morning. This will save her the trouble of having to make all the feeds from a bottle and she will not have to give so much other milk. Most important, her child will get some breast milk. If she does this, her breasts will go on making some milk and she will be able to feed her child whenever she can and also when she goes on a journey with him. It is good for the child with no mother, or the child whose mother cannot breast feed, or the child whose mother must go to work to get at least some amount of breast milk. Usually, though, this breast milk is not enough by itself.

Some other milk should be given as safely as possible. The best way to do this is to teach the mother to feed her child with a cup and spoon or a bit of cotton (see Sections 10.14 and 10.15). Cup and spoon feeding takes more time than bottle feeding, but it is safer because a cup and spoon can be washed more easily than a feeding bottle. Some mothers give a large amount very quickly with a spoon and the milk runs into the child's windpipe. This may make the child cough and choke. When using a spoon, hold the child up as in Figure 10.3 below and give very, very small amounts at a time. But even a cup and spoon are not as safe as breast feeding because bad micro-organisms can live on them and give the baby diarrhoea. In Section 10.14 you will read how these micro-organisms have to be killed with boiling water before a cup and spoon are used.

If a mother is going to feed her child artificially, she must know how much to use, how to mix it, and how much to give her child.



Figure 10.3 — Cup and Spoon Feeding

The Best Kind of Milk

10.7 After a mother's milk, the next best food for a child is milk from the buffalo, cow or goat. As you saw in Section 5.11, the main difference between mother's milk and other animal milk is that mother's milk does not have as much protein as other milk. We can make other milk more like mother's milk by doing two things: we can add a small amount of water (so that there is less protein) and we can add some sugar (so that there are more calories). Village people use fresh animal milk in this way. For city mothers, it is probably best to use the cheapest kind of FULL CREAM dried milk powder and add sugar and water to it.

Making Milk From Dried Skim Milk Powder

10.8 Milk can be made from dried skim milk also. But, because skim milk has no fat and not enough calories for a young child, oil and sugar need to be added. Many kinds of dried skim milk do not have enough vitamins. In poor areas where the only milk that mothers can have to use is dried skim milk, you should teach mothers how to use simple skim milk powder. Instead of giving them only dried skim milk powder, you should make a mixture of the skim milk powder, oil, and sugar so that the mother only has to add water. Make very certain that she understands how much water should be added, and how much of this milk mixture her child should get. If you have more dried skim milk than you need for the poorest mothers who have only a very small amount or no breast milk, you can give out the powder to be added to the porridge. As you have seen, this is the best use of dried skim milk.

Some mothers may want to buy evaporated milk. Evaporated milk has about the same food value as buffalo milk, but it is not as cheap. You should attempt to make these mothers understand that they should not waste their money on milk in tins.

<p><i>IF A CHILD IS TO BE ARTIFICIALLY FED, HE MUST GET ENOUGH MILK</i></p>

As we have seen, the most important danger in bottle feeding with other milk is starvation. The second danger is infection. You will now read about how the mother can be taught to give enough milk.

Making The Milk For An Artificial Feeding

10.9 To make the milk for a feeding, a mother needs a teaspoon and a cup. The cups used to measure here are ordinary teacups holding about 200 ml. Many others do not know the words for different size of spoons. To be certain that the mother understands, it is a good idea to let her see a spoon of the size you are talking about. Ask the mother to show you the cup and spoon she is going to use at home to make milk. If she does not have a teaspoon, ask her to buy one from the village store. A teaspoon is a small spoon of the kind used for mixing tea. All the measures given here are for teaspoons. A tablespoon is the kind that adults use for eating food.

The mother will need much safe, clean water to make the milk for her child. Because water from wells may have dangerous micro-organisms which cause diarrhoea, all water for bottle feeding *must be boiled*. The micro-organisms which cause diarrhoea die as soon as the water boils, so there is no need to boil it for a very long time. Ask mothers to keep some cold boiled water in clay pot or clean bottle, as described in Section 5.18. This water should be fresh, so ask them to change it every two or three days.

*IF YOU HAVE TO TEACH ABOUT BOTTLE FEEDING,
LET MOTHERS SEE HOW TO DO IT WELL*

Fresh Milk For A Child Under 9 Months Of Age

10.10 Most village mothers will be able to use buffalo's milk.

Teach them that for children under 9 months of age, they should take 2 "parts" of milk for 1 "part" of water. In other words, they should add half ($\frac{1}{2}$) as much water as they have milk, or they should add 1 cup of cold boiled water to 2 cups of milk. Goat's milk can be used in the same way.

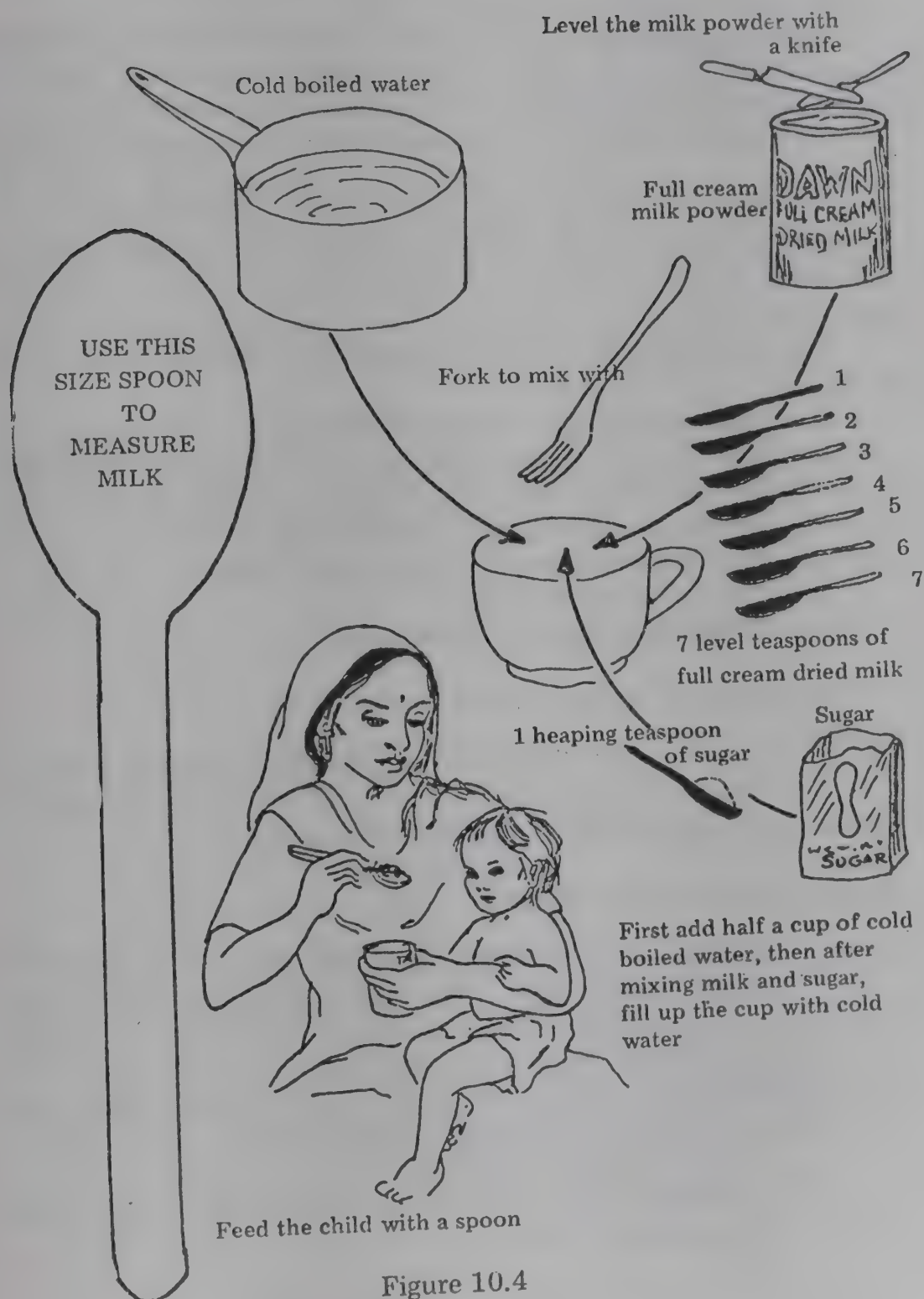


Figure 10.4
Making a Cup-and-Spoon Feed

Some mothers may have cow's milk. Teach them to take 3 "parts" of cow's milk for 1 "part" of water.

After adding water to other milk, the mother should add one teaspoonful of sugar to every cupful of milk. A "heaped" teaspoon is a full or rounded one, not one that has been made level or flat.

By adding a small amount of water and some sugar to other milk in this way, we are making it more like breast milk. By "parts" we mean 2 or 3 cupsful, or pints, or any other measure of milk to 1 cupful, or pint, or other measure, of water. The measure must be the same. That is, the milk and the water must be measured by the same cup.

When full cream milk powder is used, this is how the milk should be made:

1. Fill a cup half full of cold boiled water.
2. Add 7 level flat teaspoonsful of full cream dried milk powder. You will see in Figure 10.4 that the spoonsful of milk powder are being made flat with a knife.
3. Add 1 heaped, rounded teaspoonful of sugar.
4. Mix the milk in the water.
5. Fill the cup with cold boiled water.

Fresh Milk For A Child Over 9 Months of Age

- 10.11 A child over 9 months of age should get milk to which no water has been added. If the child wants some sugar, a small amount can be added to make the milk taste good for him.

How Much Milk To Give The Baby

- 10.12 Artificial feeding usually goes wrong because the baby does not get enough milk. The milk is weak and watery or the child is not fed enough times in a day. If a young baby is to get enough food, he must be fed 5 times a day with milk that is not watery. And he must get enough milk at every feed. Here are some simple rules for knowing how much milk a baby needs at a feed.

1. Feed your baby 5 times a day.
2. A newborn baby needs half a cupful of the prepared milk every time he is fed.

3. A 5-month old baby needs a cupful of the prepared milk every time he is fed.
4. A baby between birth and 5 months needs between half a cupful and a cupful of milk every time he is fed.
5. A baby more than 5 months old needs a bit more than a cupful.

These are only general guides, but they are the best that can be done if a cup and spoon are to be used as measures.

*AN ARTIFICIALLY FED BABY NEEDS
FIVE FEEDS A DAY*

If a mother is using a feeding bottle, it is easy for her to measure ounces or ml because these are marked on the side of the bottle. When she has found the number of ounces her child needs, she must put this amount of cold boiled water in her feeding bottle. Then she should add one level teaspoonful of full cream dried milk for every ounce or 30 ml of water.

See Section 10.8 for the way to make milk from dried skim milk powder.

A Baby Over 4 Months Should Be Starting To Get Some Porridge Or Adult Food in Addition to Milk

10.13 A baby more than 4 months of age should be getting wheat, maize, rice or millet porridge with protein foods added to it. If he is getting enough porridge with added protein, he can then drink less milk as he grows older. If dried skim milk is given in porridge, the child will be getting less liquid than one who drinks his milk. He may be thirsty and should be given cold boiled water to drink.

After mother's milk, other milk is the best food for babies. Any family that has enough money should give every one of its children over 18 months one pint (half a litre) of milk every day.

Cup and Spoon Feeding

10.14 Though there are usually not as many dangerous micro-organisms on a cup and spoon as there are in a feeding bottle, there may be enough to give a child diarrhoea. If boiling the cup and spoon is not possible, they should be washed clean, and boiling water should be poured over them to kill at least some of the micro-organisms. If there is no fuel with which to boil water, the cup and spoon must be made as clean as they can be with cold water. If boiling water is to be used to kill the micro-organisms on cups, these cups must be made of metal or clay. Plastic cups may be ruined by the hot water, but plastic feeding bottles are made so that they can be boiled without ruining them. Another way of cleaning is to wash them and leave them in hypochlorite, as in Figure 10.6.

A mother should carefully feed her baby with a teaspoon. Some babies will start to drink from a cup when they are 3 months old, or even less, and no longer need to be fed with a spoon. Sometimes a child will drink very easily from the spout of a jug. The spout is the part of a jug from which the liquid is poured. A child should be helped and taught to drink from a cup or a jug because this saves his mother time. If a jug is used, it must be washed and given with the same care that is given to a cup and spoon.

Feeding With A Wick

10.15 If a mother cannot breast feed her baby, it is frequently easier and safer to feed the child with a wick and cup. The wick should be a bit of cotton wool that has not ever been used for anything. The cup should be cleaned by boiling it, or washing it with boiled water or hypochlorite (see Section 10.19). Then it should be filled with the proper amount of milk for the child. The mother should put the wick in the milk till it is full, but not so full that the milk will drop from it. The wick should then be placed between the lips of the child. The child will suck the milk from the wick. If he does not suck well, the mother can pinch the wick a bit so that the milk goes into the child's mouth. This should be done till the child has had all the milk. The cup should be cleaned and stored and the wick must be discarded. Make sure the same wick is not used again. For every feeding, a clean new wick must be used. This kind of feeding is necessary 5 times a day for a baby.

Always Boil Other-Animal Milk

10.16 Other milk, like water, should be boiled before it is given to a young child. Boiled milk is more easily digested, and boiling kills any micro-organisms that may be in the milk. Remember that the child should be fed from a clean cup at all times. It is no use boiling water or milk and then putting it in a dirty cup with many micro-organisms.

Bottle Feeding

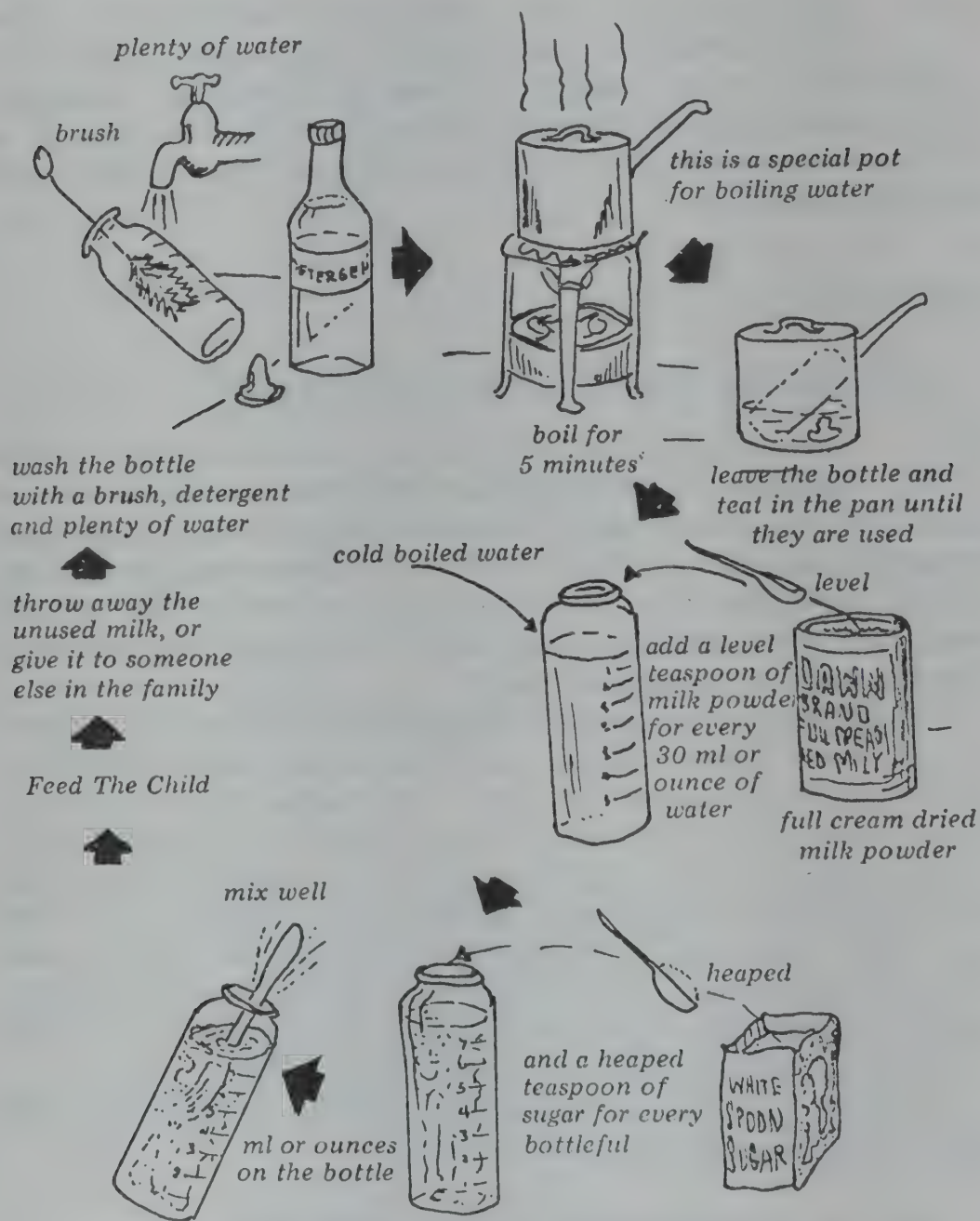
If mothers will not use a cup and a spoon or wick:

10.17 Many doctors hate bottle feeding so much because it makes so many children die that they think we should not talk about it in a book of this kind. But we must talk about it because some city mothers are going to bottle feed their children even if we attempt to teach them not to. This usually happens when a baby is very young, and it is more difficult for him to feed from a cup and spoon. What are we to say to these mothers?

Teach them to use a glass feeding bottle which can be boiled and to buy several nipples. Glass is much better than plastic because you can see more easily when it is clean. The feeding bottle must have a wide mouth so that it can be more easily washed. It should have "ml" written on its side. The hole in the nipple (teat) must be big enough. When you hold a bottle of milk with the nipple down, the milk should come out in fast drops. If the milk comes out only in slow drops, make the hole bigger. One way of doing this is to use a hot needle, but you must be careful not to make the hole bigger than necessary, or the milk will come out more quickly than the child can drink it.

Mothers must have a bottle brush, some soap or washing powder, a pan with a lid, and large amounts of fuel.

**BOTTLE FEEDING IS NOT EASY
BREAST FEEDING IS EASY**



BOTTLE FEEDING IS NOT EASY — BREAST FEEDING IS EASY

Figure 10.5
MAKING A BOTTLE FEED

Washing And Sterilizing The Bottle

10.18 The best way to kill the germs in a feeding bottle and on a nipple (teat) is to wash and boil them carefully after every feed (see Figure 10.5 on the opposite page).

A mother needs a special pan with a lid. The boiled bottle and nipple should be kept in the covered pan till the next feeding time. In this way the micro-organisms in the bottle are killed and no new ones will get into it before it is used again. A feeding bottle and its nipple should be in the covered pan, not on the floor! If the pan has a lid, then only a small amount of water has to be in the bottom of the pan. The micro-organisms on the bottle will be killed by the hot steam when the water boils. When a bottle is boiled to kill the micro-organisms, we say it is "sterilized." Boiling is very important and one reason why bottle feeding is so bad is that most mothers do not boil their feeding bottles. Because it takes much time and fuel to sterilize a feeding bottle after every feed, we must not be surprised when mothers do not do it.

WASH AND STERILIZE THE BOTTLE AFTER EVERY FEED

A mother need not have only one feeding bottle and boil it 5 times a day. She could have 5 feeding bottles and 5 nipples in a very large pan and boil them only once a day. This is quick and saves fuel, but not many mothers will understand why they should buy 5 feeding bottles or 5 nipples.

If a mother cannot sterilize her feeding bottle every time she uses it, what else can she do? The next best thing she can do is to boil it once a day and between the feedings, she must wash it with very hot water and a washing powder, rinse it with hot water many times to be sure all soap is removed, empty it, and leave it upside down to drain. *The only thing a mother must not ever do is leave a bottle with some milk in it from one feeding to the next.* In a short time, micro-organisms will grow in the warm milk. For this reason, all milk which is not drunk by the baby at one feeding must be given to some other member of the family, or thrown out.

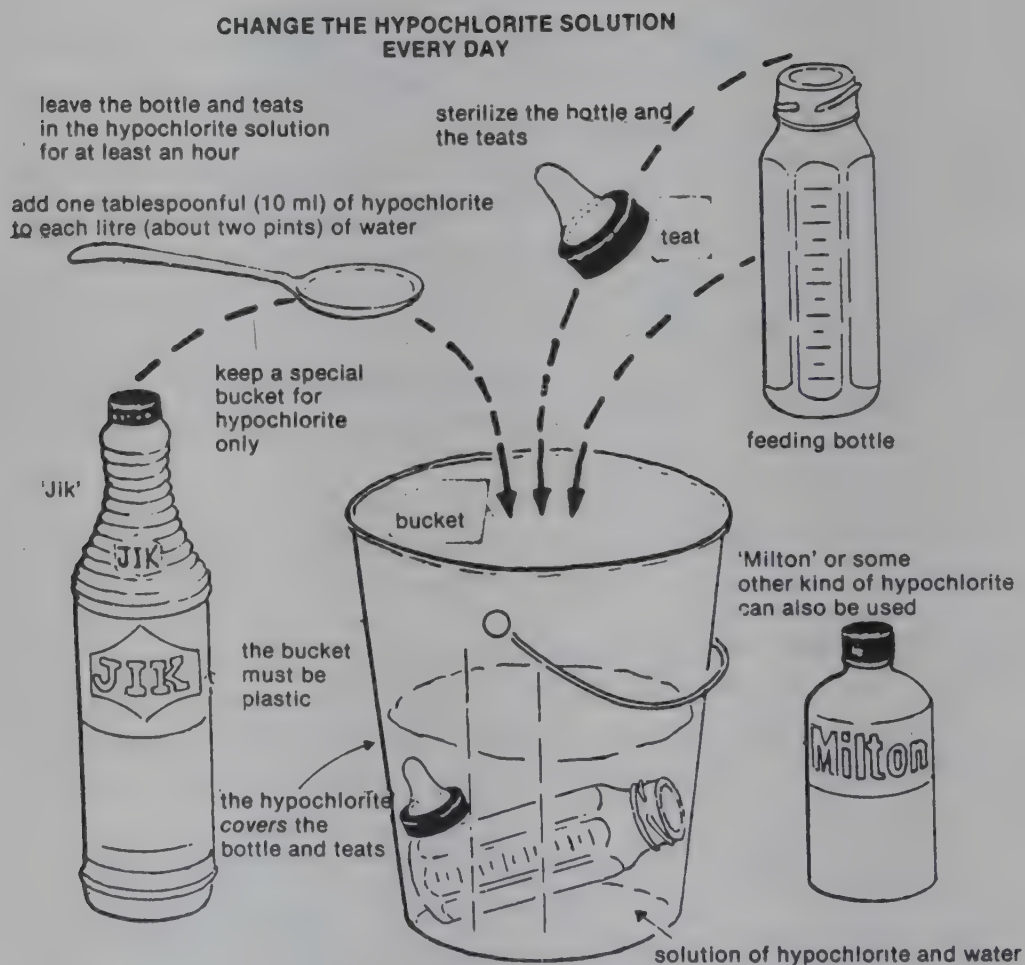


Figure 10.6
Sterilizing a Feeding Bottle With Hypochlorite

*IF A BOTTLE CANNOT BE STERILIZED
WASH IT AFTER EVERY FEED*

If a mother cannot boil her bottle at all, she must at least empty it, wash it well, if possible with hot water and washing powder, and leave it upside down to dry and drain till she uses it again. A good way of draining a feeding bottle is to leave it upside down on a stick or wire. Micro-organisms do not grow quite so well in a washed, dry empty feeding bottle.

REMEMBER, NONE OF THESE THINGS IS NEARLY AS GOOD AS BREAST FEEDING. Even if a child is carefully bottle fed he will get diarrhoea much more frequently than a breast-fed child.

Sterilizing a Feeding Bottle With Hypochlorite

10.19 There is another way of killing the micro-organisms on feeding bottles. This is to use special liquids named "antiseptics" which kill micro-organisms on the outside of the body. Antiseptics are quite safe if they are used in this way, but they must not be drunk because they are harmful to the body. The best antiseptic to use for killing micro-organisms on feeding bottles is hypochlorite. Use it like this:

1. Put enough water to cover the bottles in a plastic bowl or bucket. Do not use a metal bucket because the hypochlorite will ruin it.
2. Add one tablespoon (10 ml) of hypochlorite to every litre of water in the bowl or bucket. (A litre is about a quart, or 5 cups.)
3. AFTER EVERY FEED, wash the bottle and nipple well with cold water. Brush out the bottle with a bottle brush and soap powder. Wash the nipple well on the inside and the outside.
4. Put the feeding bottles and their nipples into the mixture of hypochlorite and water so that they are completely covered by the mixture and the bottles are filled. Micro-organisms will not be destroyed on any part of the bottle or nipples that is not touched by the mixture.

5. Leave the bottles and their nipples in the mixture for at least one hour or till the next feeding time.
6. AT THE NEXT FEED, wash your hands. Take the bottle and the nipple out of the mixture. Pour the mixture out of the bottle. There is no need to wash away the very small amount of hypochlorite still inside the bottle because it will not be bad for the baby if the hypochlorite is not very strong. Then make up fresh milk.
7. Make new hypochlorite mixture every day.

*DO NOT FORGET TO STERILIZE THE NIPPLE
AS WELL AS THE BOTTLE*

If hypochlorite is used in the right way, the bottles and nipples are safe. A mother must leave the bottles and nipples in the hypochlorite mixture for at least an hour, and she must change the mixture every day. And she must remember to buy enough of the hypochlorite every month.

All this may seem difficult and not at all cheap. Once again, we see that breast feeding is best!

CHANGE THE HYPOCHLORITE MIXTURE DAILY

Giving Vitamin C

10.20 An artificially fed baby needs a few teaspoonsful of fruit juice every day to give him enough Vitamin C to keep him from getting scurvy (Section 4.8). It is usually not necessary to give breast fed babies Vitamin C because there is Vitamin C in mother's milk. As with all other foods for a baby, make certain the fruit juice is made and stored in a clean cup or jug.

ARTIFICIAL FEEDING IS NOT AS GOOD AS BREAST FEEDING



Figure 10.7
BREAST FEEDING

Some Rules

10.21 Here are some rules for you to remember and to teach to mothers:

1. Do not have any fears about breast feeding your baby; he will not get more milk than he needs.
2. If your baby is crying and is not happy, breast feed him.
3. If you are bottle feeding, make certain that the hole in the nipple is big enough for the milk to get out, but not so big that he coughs or chokes.
4. If your baby is healthy, there is no need to give him boiled water between feedings.
5. If he is thirsty on hot days and is being breast fed, you can give him some cold boiled water.
6. Make all artificial feeds as cleanly as possible.
Bottle feeds need special attention.
7. If your child gets diarrhoea, make sure he gets enough salt-and-sugar water (Section 9.10) right away.
8. A feeding bottle is not an "artificial breast" —
it must be washed;
it must be sterilized;
it must be filled with enough milk;
it must be filled with boiled water;
.....EVERY TIME it is used!

THINGS TO DO

1. *Make a bottle feed.* Because you may be asked by mothers about bottle feeding, you must know how to make a bottle feed and what the difficulties are. Learn to make a bottle feed with buffalo milk or full cream milk powder as it is described here. Attempt to make a safe bottle feed in a villager's hut. You will find that it is almost not possible. Breast feeding is best!

2. *Make a cup-and-spoon feed.* Attempt to feed a baby with a cup and spoon. You will find that baby who is not very young can drink quite well from the cup.

3. *Make a cup-and-wick feed.* Attempt to feed a baby with a wick of cotton-wool. Is this more easy than a cup-and-spoon feed? Does the baby like it more?

4. *Find out how much milk some babies of different weights and ages should have.* Weigh the babies and work out the total ounces and ml that the babies should have for one day. What would those babies need for one week? For one month?

THE FOOD-PATH AND BLOCKS IN THE FOOD-PATH

Food-Paths

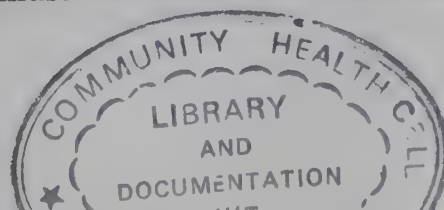
11.1 A child can grow only when he eats enough of the proper foods. These foods must come from somewhere. Foods like wheat, maize, palak, and groundnuts are grown in fields and gardens. Goats are milked and are killed for eating. Fish are taken from rivers and lakes. Then these foods have to get to the child's body from the fields and rivers where they grow. We can think of food as going on a path from the fields and gardens where it is grown to the body of the child who eats it. We will name these paths the "food-paths." Food-paths are longer for town children whose mothers have to buy food than they are for village children.

The Village Food-Path

11.2 We will think about the village food-path first. In the villages of India there are three big groups: farmers, labourers, and other workers (artisans). Farmers own, sharecrop, or rent the land and grow food. Labourers do not own land; they work for the farmers. Labourers are usually paid with a small share or part of the crop or harvest, not with money. Artisans (carpenters, mechanics, masons and others) are paid by the farmers with a share of the crop or some money.

In Figure 11.1 we can see the village food-path in white arrows, the town food-path in black arrows, and the path of money (the "money-path") in arrows with lines on them.

The village food-path starts in the fields and gardens where food is grown. If children are going to have enough of the right kind of food to eat, first enough good land must be cleared and made ready.



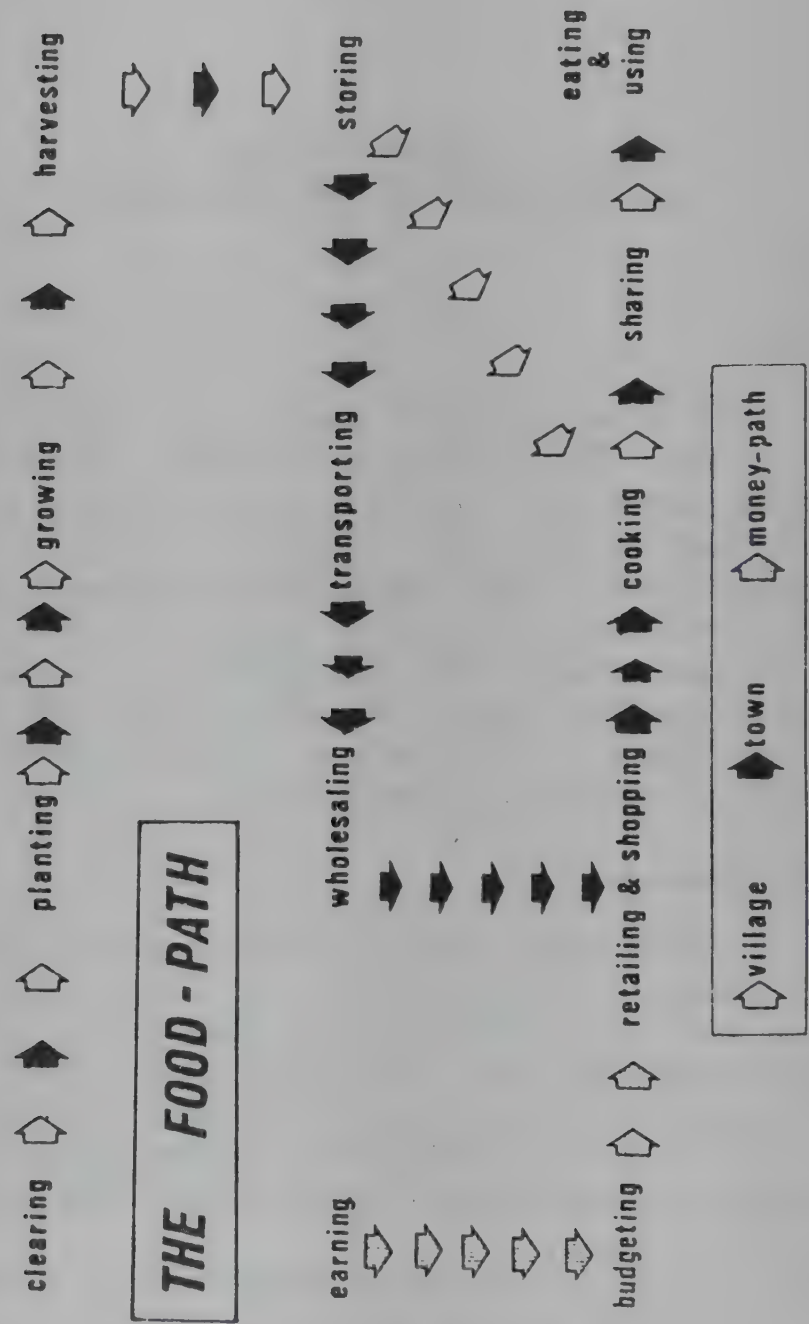


Figure 11.1
THE FOOD PATH

Good seeds must be planted at the proper time and in the proper way. Farmers, labourers, and artisans must be healthy, strong, and clever so that they can work. Then there must be the proper amount of rain or the village must develop a good way to irrigate the crops. To "irrigate" means to bring water from under the ground or a near river to the fields. In some parts of India, irrigation depends on canals. In many other villages Persian wheels, bore wells or tube wells do most of the irrigation.

Insects must not eat or damage the crops while it is growing. At the right time, the crops must be harvested (taken in) and stored for eating at another time of the year. Rats or insects must not eat the food while it is being stored. When the food is taken out of the storage, it must be well cooked and mixed with other foods. Then every child in the family must eat enough of this food at least 3 times a day.

From the time of the "green revolution" of 1968-69 in Punjab and parts of India, farmers have become even more clever in growing food. They grow much more than they and other villagers need, and then they can sell their crops to the state for distribution in the near cities and even to other states. Because the state pays high prices for wheat and maize, many farmers have stopped growing grams. This is a block on the food-path for children in villages and cities because mothers cannot get better plant protein. A farmer usually has enough milk to give his own children, so they may not be hurt very badly because of this block. But the children of a labourer or an artisan in the village may be hurt very badly by this block because their parents are paid with a share of wheat or maize and do not have the money to buy enough grams or enough milk.

The food-path may be blocked because the mothers follow bad customs. "Customs" are old or usual ways of doing things. They can be good or bad for feeding children. For example, the custom of breast feeding till the child is 2 years old is a good custom. One bad Punjabi custom is to start giving a child porridge or other food only at 9 or even 12 months of age. Some mothers believe that marasmus comes from "parchawan" and do not know it is malnutrition. Mothers who believe a child should take *only* breast feeding till 9 or 12 months and those who believe in parchawan have many more malnourished children than mothers who do not hold these beliefs.

Agricultural extension is important because it makes the amount of food grown larger and teaches farmers which are the best crops to

grow so that they produce enough of all the good plant protein. In addition, mothers can learn how and when to feed their children porridge and other foods.

In the village the food-path for children of artisans and labourers is longer than that for farmer children and it is blocked more easily. If the mother and father in a labourer's family cannot help the farmer very much with the harvest, they do not get enough wheat or maize or rice to feed everyone in the family. Sometimes the farmer may not give the labourer his proper share, even if mother and father work very hard and well. The more time a mother works in the fields to get a part of the harvest, the less time she will have with her children, and the less time she has to prepare foods that are special for them. A mother of the artisan or labourer class needs to be very, very clever to be able to feed her children and family well.

The Town Food-Path

11.3 Town children must eat enough of the right kinds of food if they are to grow and be healthy. The food-path for town children starts in the villages. Villagers first have to grow food and then harvest and store it. Many foods are processed for storage. By "processing" we mean changing the food in some way, such as grinding maize into flour, drying fish, or making sugar out of sugar cane. Food can be processed in a factory or in the home where it is frequently part of the cooking.

Sometimes the villager takes his crop to the city and sells it to the shopkeeper or even to the mothers. Sometimes a food *wholesaler* buys the food in the village and takes it to town. A "wholesaler" is a man who buys and sells in large amounts. The wholesaler then sells the food he has bought to *retailers* in the shops and markets. A "retailer" is a person who buys and sells in small amounts. A shopkeeper is a retailer. These retailers then sell food to mothers who cook it for their families.

If a mother is going to be able to buy enough food for her family, her husband must have a job so that he can get money. He must then give his wife enough of this money so that she can buy enough food all through the month till the next pay-day. This is a "money-path" more than a food-path (see Figure 11.1); it has the same end because money buys food. Food in the markets must be cheap, so that a mother with only a small amount of money can buy enough food for

her family. A mother must buy the proper foods and cook them in the proper way. Her children must then eat enough of this well-cooked food 3 times every day to make them grow strong and keep them healthy.

A town child, like a village child, must have no diseases which keep him from eating or which stop his body from using the food he has eaten. A mother who believes that a sick child should have nothing to eat but breast milk or some tea-milk puts another block in the food-path. Every child becomes ill at one time or another, and he needs more — not less — proteins and calories while he is ill. In fact, if a child becomes ill with diarrhoea or worms frequently, he may become malnourished even though his mother attempts to feed him well.

Other Food-Paths

11.4 The food-paths for staples or other products of the fields are not the only food-paths. Fish, for example, takes another food-path from lakes, rivers, or the sea, and it usually has to be dried (processed) before it is taken to the town.

Sometimes the food-path in towns is quite short. For example, a villager may grow food in the fields, bring it into town, and sell it to mothers himself. For the very young child, the most important food of all is his mother's milk. It does not have far to go to get to him!

Foods from outside the country, like dried skim milk, have a very, very long food-path. They have to come across the sea in ships.

*THE SHORTEST AND BEST FOOD-PATH IS
IS A MOTHER BREAST FEEDING HER CHILD*

Anything That Blocks a Food-Path Can Cause Malnutrition

11.5 Because many blocks are the same for the village child and the town child, we will put them together. The sections below teach you some of the more important things that can block the food-path and cause malnutrition. There are many others. You can think of these blocks as being like a tree falling across a path and blocking it, or like the bridge over a stream being destroyed so that the path is blocked.

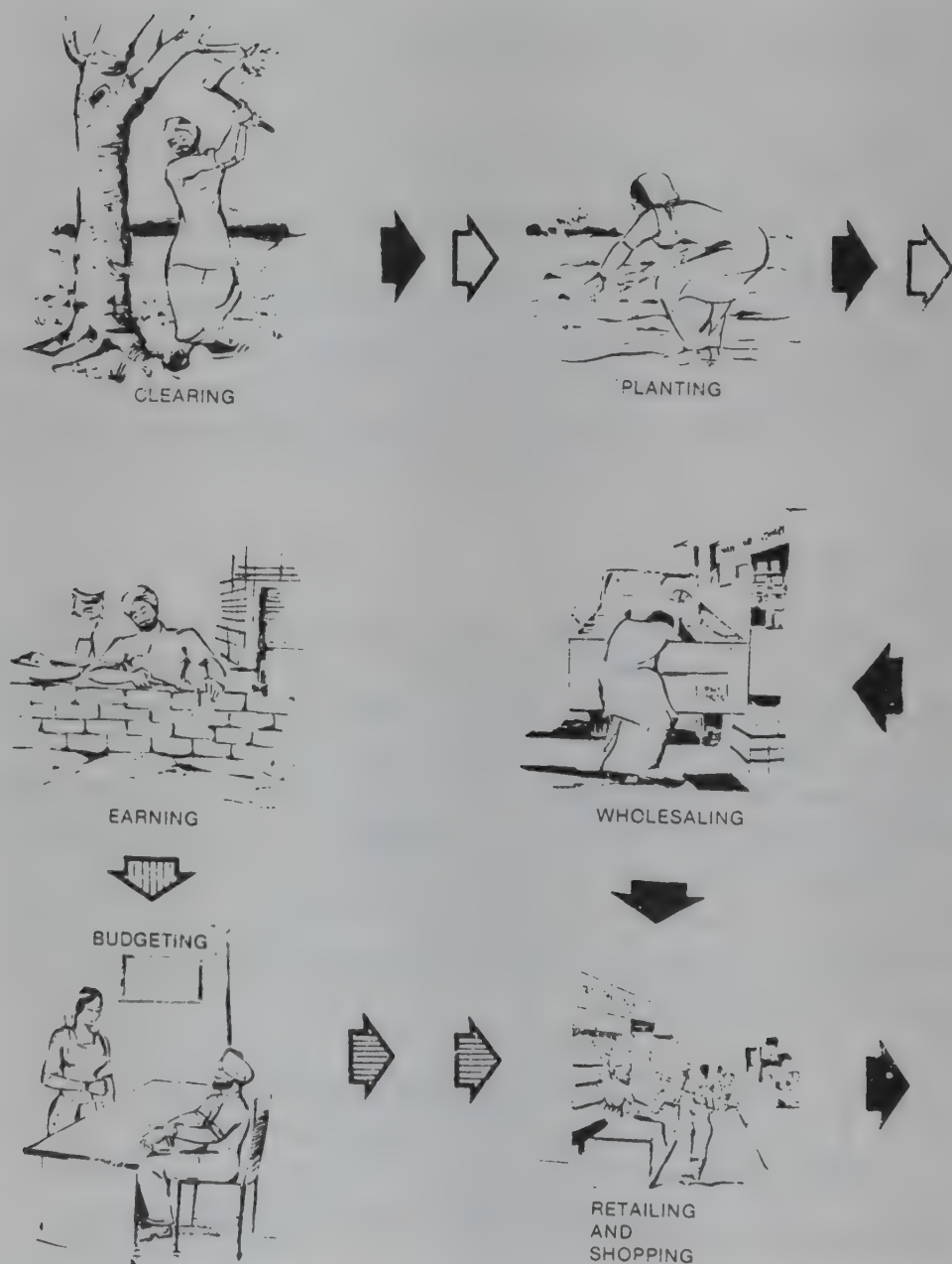
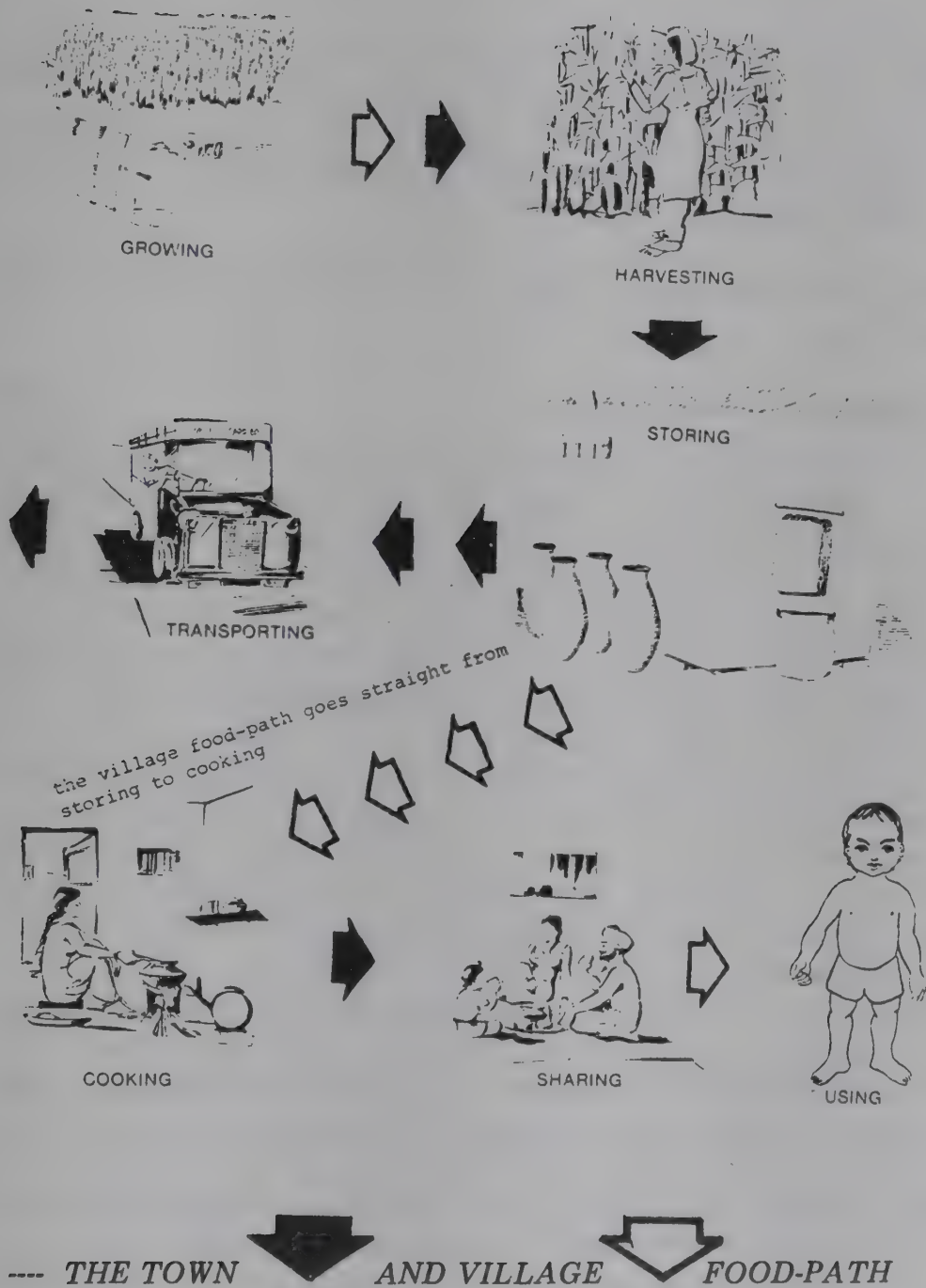


Figure 11.2 — THE FOOD-PATHS ----



**ANYTHING THAT BLOCKS A FOOD-PATH
CAN CAUSE MALNUTRITION**

Frequently the processing step for protective foods is blocked. Rice is polished to make it keep a long time, but polishing causes the rice to lose most of its Vitamin B. Par-boiling is the proper processing of rice and wheat when these grains have to be stored for a long time because par-boiling does not destroy vitamins.

Blocks On The Food-Path: When It Is Not Possible To Grow Or Sell Enough Food

Blocks In Growing Enough Food

11.6 The best time for planting is early in the rains, and in many villages everyone is very busy for these important weeks. Two very important blocks may be not enough rain (drought) or more rain than is needed (floods). One other block in the food-path is that there may not be enough time for all this busy farming work to be done if the rains start early. There may seem to be less time than people need because people have not done all the work that they could before the rains started. One way to make the work at planting time easier is to clear and plough the land as soon as the last year's harvest has been taken in. The land will then be much easier to plough when the next year's rains start. This is how not clearing and ploughing the land after the harvest can block the food-path. Another block is not enough tractors, or broken tractors, in the early weeks of the rains when everyone wants them.

In the old days, villagers did not use money and grew only enough food to feed their families through the year. Now that villagers want money to buy things, they have to grow crops and sell them. They can do two things to get this money. They can grow more of their food crops and sell the part they do not want to eat. This extra part is named *surplus crops*, or the part that is more than the amount they need for their own food. They also can grow new crops for sale, such as cotton or tobacco, which they cannot eat. We name these *cash crops*. Both of these crops (surplus and cash) can be sold in the market to get extra money that the farmer might need. The difference

between these two kinds of crops is important. In a year when the crops are bad, farmers who grow surplus crops for sale have less food to sell but still have enough for themselves and their families. The farmers who grow cash crops like cotton may, in a bad year, not have enough cotton to earn them enough money to buy food for the whole year. For this reason families who grow cash crops might think about growing food crops as well. That way, if the year is a bad one, they may have a good chance of having enough to eat till the next harvest.

Blocks in Growing the Right Food

11.7 Villagers may plant enough gram and groundnuts, but not plant the best variety (kind). They may have cows or buffaloes, but they may not have the best variety of cow or buffalo. There are many varieties of grams, groundnuts, buffaloes, and cows, and some give more food or better food than others. In every place there are best varieties of crops and animals. The ministry of agriculture has to find out which varieties are best and then teach people how to grow them. If people want to get the most from the least work, they must plant the varieties of the crops that the agricultural assistants teach them. And they must keep the best varieties of animals. All over the world there are people working hard to find good varieties of crops which give more food and are not damaged by insects and plant diseases. As soon as good new varieties of food plants have been found, they must be used.

**GROWING GOOD CROP VARIETIES
IS ONE OF THE BEST WAYS
OF MAKING NUTRITION GOOD**

There are special varieties of crops named *hybrids*. Hybrids are made by crossing, or marrying, 2 carefully chosen varieties. These varieties are the parents and the hybrid is the child. It may produce more than twice as much crop as the ordinary plant. This will probably happen even more if the plant is grown with the right *fertiliser* and has enough water.

There are many kinds of hybrid crops and farmers in India are now growing much more food by planting hybrid varieties of wheat and rice. One of the best of these is a well-known variety of rice named

IR 8. Farmers who plant *IR 8* rice now get many times more rice than farmers who still plant the old kind of rice.

Another well-known crop is a kind of maize named *Opaque Two*. In Section 3.10 you read how common maize does not have enough of the amino acid named lysine. *Opaque Two* maize is different. It has much more lysine than common maize. Because it has more lysine, the protein from *Opaque Two* maize can be used very well for body-building. The protein in common maize is not used as well. *Opaque Two* maize can be crossed (married) with the common maize of a country to give a maize that grows well in that country and which has protein that is better for body-building.

Many different ways of growing better crops have been tried out in India. In some parts of India, new varieties and new ways of farming have made such big changes and have grown so much more food that they are said to have caused a "green revolution."

In addition to the variety of a crop that is grown, other things are important. Fields must be dug in the proper way, and seeds planted the proper way at the proper time. If as much food as possible is to be grown on a piece of land, the right fertilisers must be used. A fertiliser is a plant food. One food that plants need is nitrogen so they can make the amino acids in their proteins. There is enough nitrogen in the air, but because plants cannot use it, nitrogen has to be changed into a kind that the plants can use. Many kinds of fertiliser have a kind of nitrogen that plants can use. It is the job of the agricultural extension officer to teach people which is the best kind of seed and fertiliser.

Fields are sometimes planted in a way that lets the best earth get washed into streams and rivers. This loss of good earth is called *erosion*. If the good soil is washed off, good crops cannot be grown and the food-path is blocked. Different ways of farming will stop soil erosion.

Other Blocks In Growing Food

11.8 Diseases may harm the plants as they grow. One fungus or another may grow on them, or insects may eat them. (A fungus is a bad kind of plant that grows on and damages crops.) There are special poisons that a farmer can put on his plants to protect them—fungicides that will make a fungus die and insecticides that will make

insects die. If a farmer does not know about fungicides and insecticides, or does not have enough money to buy them, or the shops do not sell them, the food-path is blocked.

Food animals, such as goats, sheep, pigs and chickens may become ill and die, and so good food is lost.

There are still more blocks to the growing of enough good food. Pests such as mice and insects may eat the seed in the ground before it has had time to grow. A pest is any useless or dangerous animal or insect, usually one that damages food. If seed is covered with an insecticide before it is planted, at least the insects will not eat it. In some districts, birds, rabbits, monkeys and many wild pigs may damage the growing crops. Crops may not be cared for at the right time so that weeds (other plants) keep the food plants from growing. The crops may be taken without being paid for by people who are not friendly with the farmer.

Damaged Food

11.9 After food has been taken from the fields, it has to be kept safely. Pests such as rats, mice, and insects may eat the food while it is being kept or stored. About one-third of all the food kept in villages is lost in this way. This means that of every 3 bags of food that are kept for use later, one is eaten by pests. Only 2 bags are left for the family to eat. This is bad because people need this food. Strong, safe places to keep food must be built to keep pests out. Insecticides may have to be put into the bags or the buildings to make the insects in them die. Agricultural assistants should be able to teach people how to build good buildings to keep their food and how to use insecticides. Every farmer should ask them what to do so that this block in the food-path can be taken away.

<p><i>FOOD IS STORED FOR PEOPLE, NOT PESTS</i></p>
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Trouble With Transport

11.10 In some farm areas there may be no roads to take food in town, or the roads may be bad. There may not be enough trucks, or truck drivers may drink alcohol, drive badly, and destroy

their trucks. Trucks may stop running and there may not be any other trucks or parts with which to repair or rebuild them. Transport is usually worse from the villages to the food depots (stations), than it is from the food depots to the town. A food depot or station is a place where the food can be stored and from which it can be sold.

All these difficulties block the food-path for town children because food has to be transported or carried from villages to towns.

Blocks On The Food-Path: When There Are Many People

Many People and Not Enough Land

11.11 In many districts of India, there are so many people that most do not have enough land to grow food on. In these districts, not enough land is a serious block in the food-path. People can move to find land in other places, or they can learn how to grow more food from the same land.

There is no reason why anyone should have many children if she does not want to. She can have 2 or 3, not 4 or 5. In this way the land is not full of people so quickly. Having children only when you want them is named "*family planning*." People in India are learning to use family planning so that there will be enough land for everyone.

Not Much Time Between the Births of Children

11.12 You will remember that in Chapter 7 we saw how a child needs his mother's milk till he is 18 months or 2 years old. Anything which stops his getting this milk is bad for his nutrition. One thing that may stop him from getting this milk is his mother becoming pregnant again. Though it is quite safe for a pregnant mother to go on breast feeding her child, many pregnant mothers do not want to breast feed their small children. The pregnant mothers who want to keep on breast feeding frequently find that their breasts make less milk. The mother's own nutrition may become bad when she has 3 people to feed — one at her breast, another in her womb and herself. A mother should use family planning so that she does not become pregnant while she is breast feeding because it is bad for her own nutrition and for that of her children. But stopping the breast feeding because the mother is pregnant can only harm the child much more.

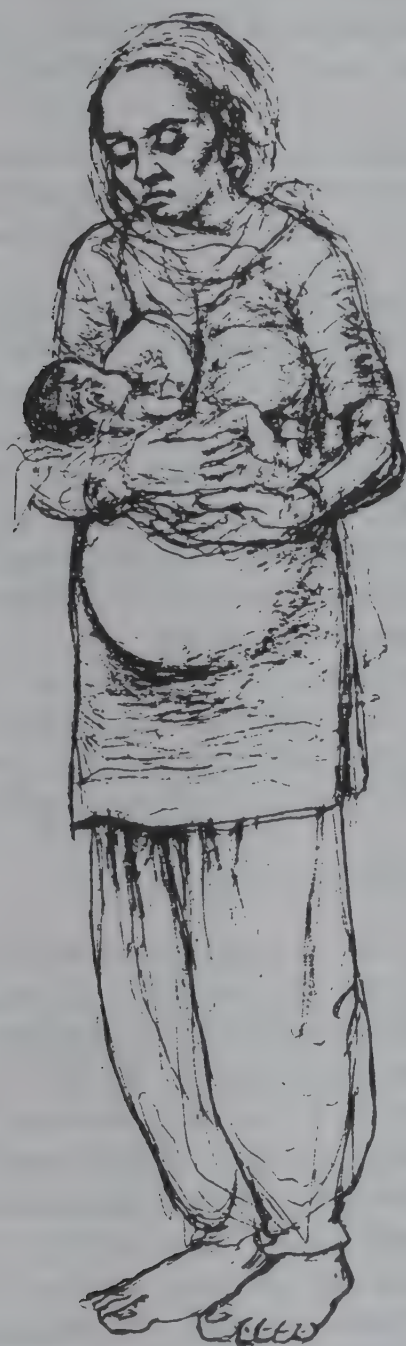


Figure 11.3

Mother Nursing While Pregnant

If we are to keep a mother from becoming pregnant while she is breast feeding, there must be a proper space of time, or birth interval, between the births of her children. This birth interval should be at least 30 months, and in the poorest families it should be 3 or even 4 years.

A SHORT BIRTH INTERVAL BLOCKS THE FOOD-PATH

But some mothers these days have a child every year and this is bad for their own nutrition and the nutrition of their families. Why does this happen when it did not happen so many times in the past? The old ways are changing. A girl may not be taught all she should know about not becoming pregnant. Many women may stop breast feeding early and we know now that the old traditions were right in saying that breast feeding increased the spacing between pregnancies. The result is that children are not as well spaced as they once were, and this helps to cause malnutrition.

What can we do? Many new and good ways have been found by which parents can have children only when they want to. People should be able to find out about these new ways named *family planning* and get what they need at every hospital and health centre.

More Children Than Are Wanted

11.13 We have seen that children coming with a very short birth interval is bad for nutrition. In addition, many children in a family can be bad for the nutrition of that family and of the country.

It is easy to see that children will be malnourished if there are many of them and there is not enough money to buy food. Having so many children is related to many other blocks in the food-path as well as to lack of food for them. Having many children is related to lack of jobs. As you will read below (Section 11.14), this is a serious block in the food-path. Let us say, for example, that a man and his wife have 7 children. Two of these children die, but 5 of them will still grow up to have children of their own. This means that, though there are only 2 parents now, there are going to be 5 living children, or more than twice as many children as there are parents. When these children marry and every one of them has 5 living children in their turn, there will be 25 grandchildren for 4 grandparents. When most parents have as many

children and grandchildren as this, the number of people in a country grows very fast. There are many countries which double their number of people about every 25 years. If a country has 4 million people now, it will have 8 million in 25 years.

When a country grows as fast as this, it cannot build schools, hospitals, and clinics fast enough. There will not be factories and offices to give people jobs. This means that many people cannot find jobs. They can stay in the farm areas or go back to work there, but many of them do not want to do this. The towns, then, grow very fast and there are not enough schools, jobs, clinics, or houses. Because people have to have some place to live, they build houses for themselves in the bastis. Because they have to have something to eat, they may eat the food of their relatives and this blocks the food-path of the relatives. Or they may take food from strangers or out of the fields, and if food is stolen in this way, the farmers may stop planting crops. This will block the food-path for everybody.

It might be all right to have the number of people grow fast if they did not want schools, roads, hospitals and clinics. But everyone wants these things. It is very important, then, that the number of people in a country grows slowly so that every person can have a job, school, and clinic that he needs. Family planning helps the number of people in a country to grow more slowly. With family planning there can be more time between one child and the next, and families can be less big and can feed their children well.

*FAMILY PLANNING HELPS THE NUMBER OF PEOPLE TO GROW
MORE SLOWLY AND THE COUNTRY TO DEVELOP MORE QUICKLY*

The number of people in a country must stop growing some time. If it did not, sometime in the future, there would be so many people that not one of them would have enough space to sit down! In fact, the number of people must stop growing long before this happens. There will be some number of people that will be best for the country and the country should not have more than this best number of people. This is the number that will give every person in that country a chance for the best life. It is difficult to know exactly what this number is, because it changes over time as the country develops. Family planning makes it possible for the country to reach its best

number of people as slowly as necessary for the country's development. Family planning will not make the number of people less than it was before. Let us put it in another way. It is not bad to have many people in a country if everyone has a chance to have a good life. The number of people can, in time, be large. What does matter is that *the rate (speed) of growth must not be very fast.*

If the number of people in a country can grow more slowly, every person can have a good life. He would have a good chance to get a place in school, a job, or a bed in the hospital when he is ill. Some blocks in the food-path would be taken out and his nutrition would be good. This is one reason why family planning is so important and why every clinic should be able to teach mothers and fathers about it. In the old days, families had many children because so many of them died. But now more children are living and, as we stop malnutrition, even more will live. If every one of those who live is to have a good life, a place in school and a job, a family could have less children and the number of people in a country grow slowly.

Blocks On The Food-Path: When There Are Blocks in the Money-Path

Lack Of Jobs

11.14 Let us now think about the money-path and how blocks on it can harm nutrition. In Figure 11.1, the money-path has arrows with lines on them. The first step on the money-path is getting money. The family has to get money by working at a job or by growing food or other crops. Budgeting is the next step. This means that the family must make a decision about how much money is to be spent on food and how much on other things. Then the money for food must be spent in the best way; here the money-path meets the food-path at the place named "retailing and shopping."

In towns, the money-path is as important as the food-path for good nutrition because people have to have money to buy food. This means that in towns, where people cannot have big gardens in which to grow food, they have to have jobs from which they can get money. In most Indian towns there are not enough jobs for all the people who want them. Many people have no jobs and are said to be "unemployed." We can see how *unemployment* blocks the money-path at the very beginning. There are many reasons for unemployment in

towns, but as you read in Section 11.11, one big reason is that the number of people in the country is growing so fast that it is not possible to make jobs quickly enough for everyone.

Bad Budgeting

11.15 Because not many families have all the money they want, they must use their money to buy the things they need most. The most important thing of all is enough of the right food. Only after the family buys enough of the right food can it use the extra money for such things as radios, bicycles, or special clothes. As we have seen in Section 11.14, planning to spend money wisely is named "*budgeting*." Some families have such small amounts of money that it is almost not possible for them to budget. In many town families, the husband does get some money every month. It may not be much, but it is usually enough to feed his family well if it is spent with care. Many families find it difficult to budget this money well enough. They spend most of it as soon as they are paid, and by the middle of the month there is not enough to buy food. Their children are then badly fed and become malnourished. Many people do not know that good food is more important for their health—and for their children's health — than beautiful clothes. India is a warm country and most of the year clothes are not needed to keep people healthy. Winter clothes in North India are needed but there is no need to pay for gold or other ornaments on them. Many people pay more money for beer than for food.

In the villages people do not think of money as being used for buying food because food is grown and does not have to be bought. When village people come to town, they may not think that the most important use of money is to buy food. We must do all we can to teach them about the best use of money.

Bad budgeting blocks the money-path and if it is to be taken out, families must learn how to budget the money that they get and pay out every month.

Bad Shopping

11.16 A family may budget well and save enough money for food every month. But a mother may not buy food in the cheapest way. She may pay more money for small amounts of food when

she should buy it cheaper in large amounts. She may pay much money for such foods as ghee, or go to shops that are not cheap when she should go to cheaper ones. The shops that are not cheap are frequently the ones near her home, and a mother may have to walk far to get food that is cheaper. If she walks to the cheaper shops and buys by weight in larger amounts, she will be able to feed her family in a better way for the same money.

Blocks In The Food-Path: When Children Are Not Fed Properly

Bottle Feeding

11.17 The most important food-path for a young child is the one from her mother's breast. A block in this food-path can be so serious that all of Chapter 10 is about bottle feeding and how dangerous it may be.

Shares Of Food That Are Not Enough

11.18 Though a mother may grow or buy enough food and she may cook it well, her younger children may still become malnourished because they do not get their part of the family's food. A young child needs much food for his size because he needs much protein and calories for growing and playing. But a young child eats so slowly that the others in the family may have eaten everything before he has had enough. In many families, the father gets the big share of food and most of the protein food. The young child does not get enough to eat.

Shares of food that are not big enough for the young child can be a serious block in the food-path, even in families who buy and cook enough food. It is good for every young child to have his own plate and spoon, and to be helped to eat, and to have at least 3 meals a day. By doing these things, one of the last blocks in the food-path can be taken out.

Mothers Not Knowing the Best Way to Feed Their Young Children

11.19 Many mothers do not know the best way to feed their children. They may not know that children should start eating porridge at the age of 6 months or they may not ever give their children porridge. They may only give them chappati and not palak

or sarson ka sag. They may only feed them 1 or 2 times a day, and not know how important it is to feed them 3 or 4 times a day. There are several reasons why mothers do these things. One of them is that they do what is the custom (see Section 11.23) and do not know that there is another, good way of feeding children. This block in the food-path can be taken out by teaching mothers how to feed their children.

Advertising

11.20 Some people make money by selling feeding bottles and tinned milk for bottle feeding. Other people make money by selling beer or fizzy drinks. They attempt to get other people to buy these things by putting up signs and advertisements about them, or they advertise these things in the movie theatres. This advertising is bad for nutrition; and advertising for bottle feeding is the worst. The advertisers of bottle feeding attempt to block the most important food-path for young children, the path that milk takes from a mother to her child. Even if this is the shortest food-path it is the most important one of all.

Blocks In The Food-Path: When People Are Ill

People May Be So Ill That They Cannot Work Hard

11.21 A farmer or labourer may not be ill enough to go to the hospital, but he may be ill enough that he feels very tired and is not able to work hard. Many people are a bit ill with malnutrition, anaemia, malaria, tuberculosis, leprosy, or some other disease. These diseases are common. Many farmers have some or even all of them and we should not be surprised that they cannot work well.

Malnutrition makes a farmer tired and ill, as a result he can not work enough to grow more food to feed himself or his family, and remains malnourished. This is like a circle that goes around and round without any end to it. This kind of dangerous circle is called a "vicious circle." The vicious circle of malnutrition and work is serious.

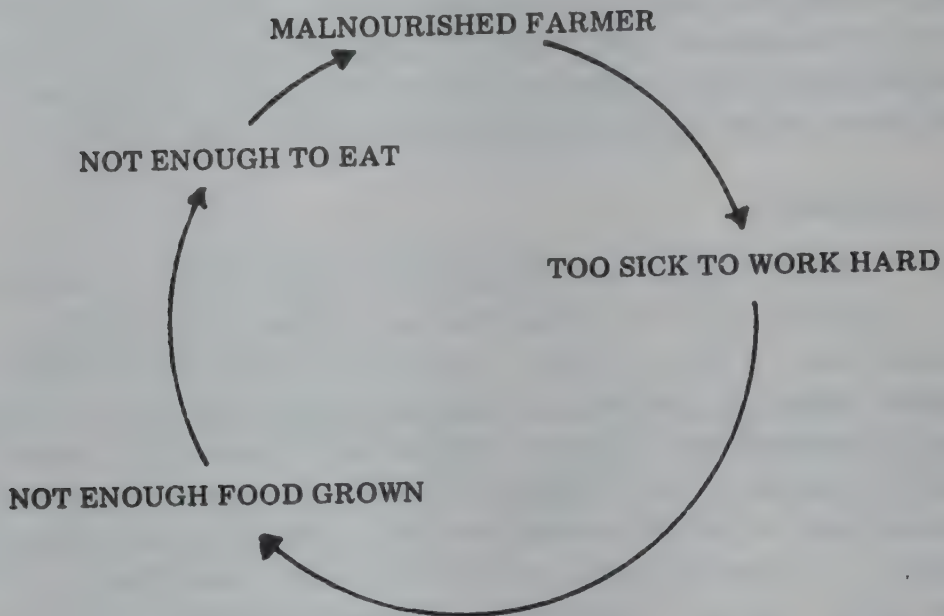


Figure 11.4
A Vicious Circle of Food Production

Diseases That Waste Food and Stop the Body Using It

11.22 A child may be ill with measles, whooping cough, diarrhoea, worms, or other diseases. His illnesses may make him dislike his food and not be hungry, and because he does not eat, he becomes malnourished. Measles is a good example because it makes a child's mouth painful so that he does not like to eat. If a child has diarrhoea, the food that he has eaten may go out of his body in his stools. If he has worms, they may eat some of the food he has eaten and stop his getting it. Diseases like these are the last blocks in the food path, and they have to be taken out. Every child should live in a clean place and be given clean food and clean water. Then he will not get worms or diarrhoea so quickly. He can be given special medicines named vaccines to stop his getting measles. When a child is ill, he should be fed dahlia and other soft foods such as khir and khichri.

Blocks In The Food-Path: When Other Old or New Things Block The Food-Path

Customs That Block the Food-Path

11.23 Some customs are good for nutrition and some are bad. In many parts of India, it is the custom for a mother to go on breast feeding her child till he is 18 months or 2 years old. This is a good custom because every child needs his mother's milk all this time. Some places have the custom of not feeding the child when he is ill. This is a bad custom, since lack of food will make him more ill.

As the country develops and the farmers and labourers have many good machines or ploughs, they may be able to do more of the field work themselves. This way at least some of the poorer women can spend more time at home and not in the fields. Indian villages may want to set up "day care centres" (Balwari) so that every child is well cared for even when his mother is in the fields. But even if there is enough food and the mothers are free to care for the children, there are still some problems. It will still be very important for you to teach the mothers and fathers how to give the food to their children to keep them healthy. Not knowing the best ways to feed children is a very important block on the food-path. Most of the time not knowing these things is only a matter of doing things in the old or customary way. But we should remember that not all customs are bad; some are good. When you teach in a village, you should talk to people about their good customs such as breast feeding a long time.

Lack Of Fuel

11.24 Most food has to be cooked, and cooking needs fuel such as dung, dried grass, wood, or kerosene. Getting fuel may be a problem. Wood may have to be carried some distance and kerosene must be paid for with money. One reason why many families cook only one time a day is that they do not have enough fuel. This is bad because young children need porridge at least 3 times a day. In this way, lack of fuel blocks the food-path and helps to cause malnutrition (see Section 8.1).

Broken Families

11.25 When a father and mother leave one another (become separated), their children may become malnourished. When a family is broken this way, a town mother has nobody to work and earn money to feed her family, and a village mother has nobody to help her grow food in the fields. Children may become malnourished when a mother has no house of her own and they all have to stay with relatives. The children do not get a large enough part of the food that is cooked for everyone.

*A CHILD STAYING WITH RELATIVES
IS FREQUENTLY MALNOURISHED*

Alcohol

11.26 When a person drinks much country liquor, he gets drunk. He gets drunk because these drinks are made of something named "alcohol." Alcohol blocks the food-path in many places and causes much malnutrition. Farmers may be drunk when they should be clearing the land for planting. Food such as bajra may be made into beer when it should be made into a child's porridge. Drunken drivers may damage the trucks that could take food to town. Some Indian fathers buy so much alcohol that there is not enough money left to buy the food their children need. Money that can be used to buy food is wasted to buy alcohol and there may not be any money left to buy enough staples, milk or vegetables which the family



Figure 11.5
Alcohol Blocks Food-Path

**ALCOHOL IS ONE OF THE IMPORTANT BLOCKS
IN THE FOOD-PATH**

needs. Some fathers start drinking early in the morning, and then they may lose their jobs and not be able to feed their families. For all these reasons, alcohol is one of the worst or most serious causes of malnutrition in many places.

Blocks Are Joined Together Like the Threads of a Spider's Web

11.27 Many blocks in the food-path are joined to one another. Bottle feeding and the desire to be modern are joined together. Custom is joined to many blocks in the food-path such as the way the fields are planted, and how children are fed. Poor knowledge is joined to bad budgeting as well as to the wrong ways of feeding children. Diseases stop people from working hard and stop children from eating. From these examples you can see that blocks in the food-path are joined to one another in many ways. It is as if they were tied together like the threads of a spider's web.

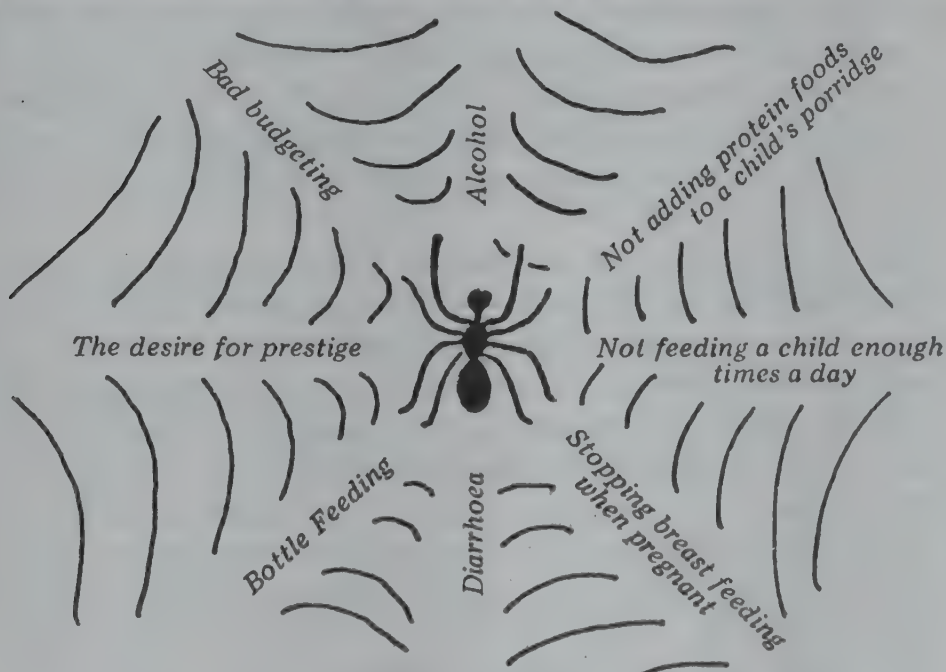


Figure 11.6

Tied Together Like a Spider's Web

Many Blocks At The Same Time and Place

11.28 The food-path is usually blocked in several places at once. Sometimes one block is the biggest cause of malnutrition, sometimes it is another. In one place or in one year, insects may destroy the crops, block the food-path, and cause malnutrition. In another place or in another year, heavy rains at the wrong time may damage the crops. Sometimes drought (no rain) blocks the food-path. Sometimes war blocks the food-path very seriously. Usually there are many blocks at the same time. Fathers without jobs, much beer drinking, and bad bottle feeding are other blocks on the food-path which help to cause malnutrition. Every time and every place has its own special mixture of blocks.

**MOST MALNUTRITION IS THE RESULT OF
MANY BLOCKS IN THE FOOD-PATH**

How Many Things Block The Food-Path For Some Children

11.29 As malnutrition in the community may be caused by many blocks in the food-path coming together, so many things may join to block the food-path of only one child. Here, for example, is the story of how one child became very malnourished. He was found at home because his family did not think he was ill enough to take to a clinic.

Mal Singh was exactly 2 years old. He weighed 8.3 kg and had an arm circumference of 12.5 cm (a well nourished child of this age weighs 11.5 kg and has an arm circumference of about 16 cm). He did not look malnourished till he stood next to a well nourished child of the same age, when he was seen to be much shorter than he should be. His arms were thin, his head looked very big for the size of his body, and his stomach was swollen. Some of the hairs on his head were pale, but his skin was normal, and his legs were not swollen. He looked sad and spent most of the time sitting quietly in a corner of the court yard not playing. His mother was out in the fields most of the day.

Mal Singh had one brother, Ramesh, who seemed quite well nourished, and a young sister, Gudi, aged 3 months. As soon as Mal

Singh's mother had become pregnant with Gudi, she had stopped breast feeding him. She attempted to bottle feed him with a mixture of tea, milk, and sugar.

Mal Singh's father had left the village and worked in Calcutta. The family was living with Mal Singh's uncle who was frequently drunk. He gave the family Rs. 35 every month. When the family was visited by a Health Worker, the uncle was away and the mother had no money. They lived in a small two-roomed mud house without windows in a poor area of the village. The family had 2 pots, a small table, 2 chairs, a broom, an empty "fizzy drink" bottle and almost nothing else. There was no fuel in the house. The hot season was beginning and, because the wells were starting to run dry, water had to be carried for over a mile.

The mother said she gave Mal Singh chappati and tea in the morning and evening. Sometimes the family had green leaves. They did not have meat, milk, eggs, fish, beans or groundnuts.

Mal Singh had not been to the Well-Baby Clinic, even though it was only 2 kilometers away, and a doctor said his mother should take him there. Mal Singh's mother had said she thought it was very far to walk.

We see from this that Mal Singh was very much underweight for his age. Though his hair was like a child with kwashiorkor, and he was sad and did not run or play, his skin was healthy and he had no swelling in his legs. He was not thin enough to be a real case of marasmus. A very underweight child, he had the start of marasmus, and might get it at any time. Measles would easily bring on marasmus. Many things were blocking his food-path. His parents were separated and his mother was staying with her brother. The worker of the family did not have a good job and much of the time got drunk with money that should have been used to buy food. His mother was away in the fields most of the day. She had stopped breast feeding him when he was only a year old because she had become pregnant again. He was not fed enough times in a day and was only given chappati. He did not have a plate of his own and he was not helped to feed himself with a spoon. We can see the very many blocks on his food-path.

The most dangerous time for malnutrition in many communities is in a child's second year. This is between his first and second birthdays. You can see from the story of Mal Singh how many things can block the food-path at this age. Though he needs much protein

and many calories for his size, breast feeding is ending and he is not big enough to eat like the grown people in his family.

Health Education Can Take Out Many Blocks

11.30 We have now made a long list of blocks on the food-path.

When we look at them, we see that many of them come from people doing things in the wrong way for good health.

We must be careful about using the word "wrong." It has different meanings and these meanings are important. Some things that we say are wrong are those that most people believe should not be done, for example, going without clothes on the street. Most blocks in the food-path are not like this. Usually people are doing what they believe is the "right" thing. They may be doing things that most people do in their villages and country, such as not feeding porridge to children. Or, when a woman stops breast feeding while she is pregnant, she may only be doing what is the custom. But we can say that these things are wrong because they are bad for the health of children. We should not make women feel shame for doing these things, but we should teach them to do things differently.

Many blocks in the food-path are examples of acting in the wrong way for the health of the family, even though many of these ways seem "right" to the people who do them. These blocks can be taken out if we can make people understand why they should change and how they can do the right thing for their own health and that of their families. This is named "*nutrition education*" and it is one important way of fighting malnutrition.

Nutrition education is only part of the very large field of health education. Health education attempts to keep people healthy and stop them from getting diseases of many kinds by teaching them to change what they do. Health education attempts, for example, to stop death on the roads by getting people to stop driving while they are drunk. Agricultural and nutrition education are closely related. When we teach a farmer how to grow groundnuts that are good and to eat more of them, we are teaching him good agriculture and good health at the same time. Nutrition education, which is one part of health education, is of such great importance that it is why much of this book, and all of Chapter 12, has been written.

THINGS TO DO

1. *Blocks in the food-path.*

If you visit families and observe them carefully, you will soon get stories like that of Mal Singh in Section 11.29. Every student should visit the family of a malnourished child and attempt to find the different blocks in the food-path that have caused him to be malnourished. Every student should write a story about at least one child and then read the story out loud in class or distribute copies of it. The class can be asked to list all the blocks on the food-path in the different stories. The students can then talk about what could be done to take out these blocks.

2. *A paper on food customs.*

Write a short paper describing the food customs in your own family.

3. *Advertising*

Let every student bring in an advertisement and discuss it in front of the class. What does the advertisement say about the product? Why do people buy the product? Do people need it? If it is a food, what do people think they get from it? Is the advertisement a block on the food-path? If so, why?

4. *Nutrition from the newspapers.*

In a nutrition course, one or more students should cut from the newspapers everything that has something to do with nutrition and give daily or weekly reports to the class.

HELPING FAMILIES TO HELP THEMSELVES

What Help Do Families Need?

12.1 Many families in the villages have health problems. Most of these problems cannot be helped by only giving out medicines. To live a healthy, strong and long life, families need to learn about nutrition, hygiene, family planning and other things. Helping the families to help themselves is done by teaching the families what they need to know to work against their problems.

EVERYONE MUST HELP TAKE OUT FOOD BLOCKS

We saw that there were many blocks because people did not do things in the best way; people behaved in the wrong way for good health. We saw that these blocks can be taken out of the food-path if we teach people to change what they do. If a mother does not add protein foods to her child's porridge, we attempt to make her add them. If she feeds her child only once a day, we attempt to make her feed him 3 or 4 times. We know that if she does these things, her child will grow well. We attempt to make fathers give their wives more money for food, and farmers grow more protein foods. In all these ways we are attempting to have mothers do something that is good for their children. It does not matter very much if a mother learns much about protein foods. What is important is that she adds proteins to the child's food. To do the right thing most of the time, she will need to know something about why she should do this. You can teach her to know the answer through nutrition education.

*TEACHING IS A VERY IMPORTANT PART
OF A WELL-BABY CLINIC*

Let us say that we have taught a mother something and we are certain that she understands it. How can we make certain that she does it? This is not easy, but there is one thing that we can do. *We can attempt to find something that a mother wants very much and then let her know that she can have it if she does what we have taught her.* If we learn that she wants her child to do well at school and we know he needs a breakfast before he goes to school, we can say to her that her child will be better at his lessons if she gives him breakfast before he goes to school. Because she wants him to do well at school, she may give him breakfast before he goes.

Sometimes there may not be anything that a mother wants. We may have to make a mother want something and help her to see she can get what she wants. We have to help her know, for example, how important it is for her child to do well at school.

We can see that our job is to attempt to help people *to do things*. Knowing what to do and understanding why it is a good way are only the beginning. *Doing* is what is most important. We can see if the teaching has done its job if ways of doing the things are changing. We may be teaching mothers to add protein foods to their children's porridge. Are they doing it? We can find this out by visiting their homes and seeing if they do so. We can weigh their children to see if they are gaining weight. Finding out if health education is **working** is named "*evaluating health education.*" This is important. What is the use of teaching if we do not attempt to find out if the teaching is working?

Many mothers need health education, but not many can come to classes for nutrition education. What can we do for the others? The answer is simple — all of the mothers that we teach must teach other mothers! Health education has only been useful if the people we teach to change their behavior go out and teach other people to do the same. We must attempt to do one very important thing — make every mother a teacher. Let those who know teach those who do not know. In the next section we will discuss how people learn and what we have to do to be good teachers.

LET THOSE WHO KNOW TEACH THOSE WHO DO NOT KNOW

The Health Worker As Teacher

12.2 To be a good teacher, you have to know well what you are to teach; you have to trust the villagers and they have to trust you; and you have to have skill in teaching. You should keep in mind that learning is changing what one has done up till now, and that this change takes time and work.

Knowledge

12.3 People frequently forget that you cannot teach well what you do not know well. This manual on nutrition, and the others on child care and women services and family planning, have been written so that you get to know about most of the problems you will have to care for in Indian villages. To know well is more than having heard about, having read about, and being able to talk about. If you know nutrition well, you are able to make balanced meals, you make them, feed them to your family, and eat them yourself.

Before you can teach others, you must be quite certain that you are doing all the things you are teaching. Frequently, people will do things because they see other people who they respect do them. Village women see very quickly if the Auxiliary Nurse Midwife or Lady Health Visitor does not do the things she teaches. Do you boil the water? Do you breast feed your child? Do you give your family three balanced meals a day? If you want others to learn these things you should do them yourself. What you do teaches others more than what you say. At all times, do what you say, and say what you do.

<p><i>DO WHAT YOU SAY, AND SAY WHAT YOU DO</i></p>

Trust

12.4 Villagers, like other people, can only learn from someone they trust. In most cases, trust is slowly built up as people find out about you and your work. First of all, most people will need to feel that you like and respect them, and you have trust in yourself. Next, they need to see you are really interested in your work for them. Lastly, as trust grows, people will want to know more

about you and will want you to know about them. But, be very careful. If a village woman says something to you, you must keep it to yourself or you will lose everyone's trust. Letting people know that you like and respect them and having trust in yourself cannot be done only with words. Through what you do, you will have to let them know that you trust them and they can trust you. Be friendly, respectful, and proper in your behavior and you will be saying, "I trust you." Be understanding and patient and you will be saying, "You can trust me." Do not forget that what you do will speak more loudly than what you say.

BUILD — TRUST

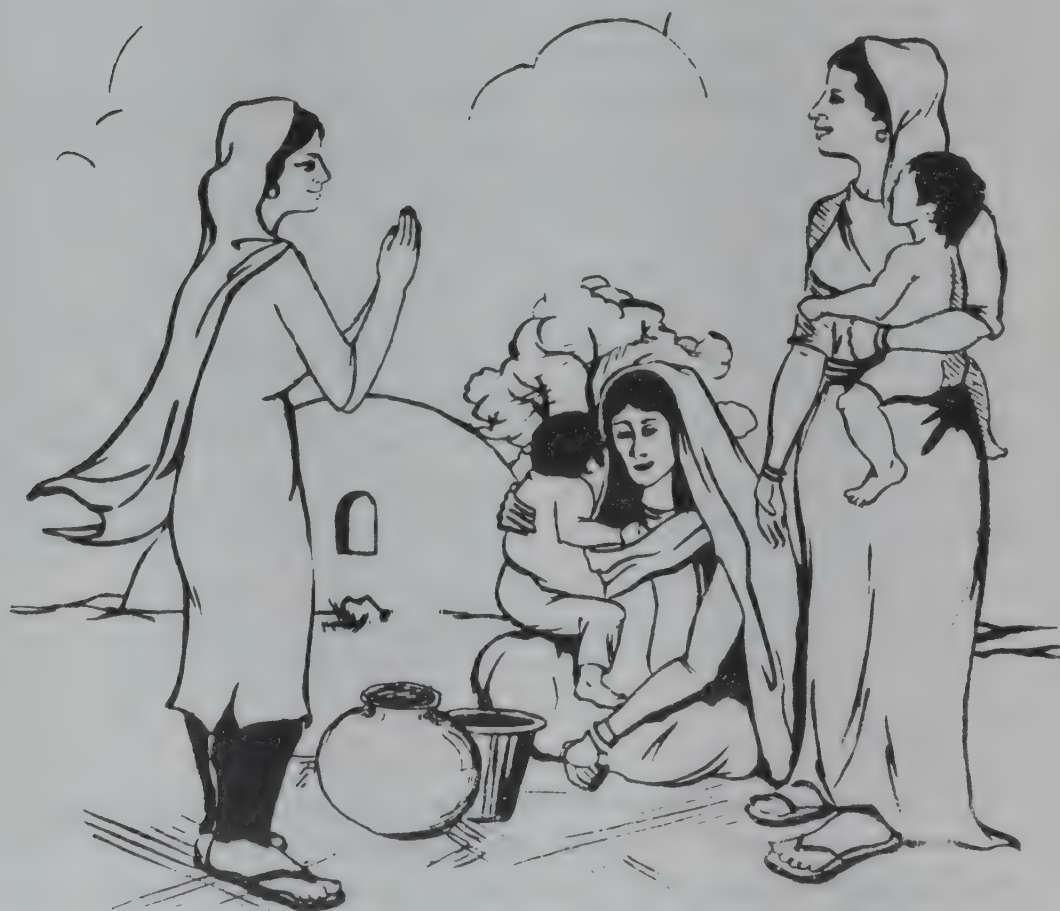


Figure 12.1

Be Friendly, Polite and Respectful to Mothers

In the same way, you have to believe that you can teach and that families can learn. If you believe you cannot teach or the families cannot learn, you will not be able to teach.

You can teach because you have knowledge about healthy living and live a healthy life yourself. The families can learn because they want to know how to make their lives good.

FAMILIES CAN LEARN AND YOU CAN TEACH

Trust is built on the fact that people see you are interested in your work for them. If you open the clinics at regular times, are there for emergency calls, and give as much help as possible in the homes, people will feel you are interested in your work for them.

TRUST IS BUILT ON YOUR INTEREST IN YOUR WORK FOR THEM

Part of trust is the growing knowledge of one another and of oneself. A good teacher knows herself and is willing to let others know her. In health work this is easy to see because villagers do have many questions they want answered before they are willing to listen to suggestions. At your first visit they want to know at least your name and your work. But this is only the beginning of getting to know you; later they will want to know why you became an Auxiliary Nurse Midwife or Lady Health Visitor, if you are married, if you have children, and many other things. Give good, clear answers. The more the village mother can understand who you are, the more she will trust you, the more she will be willing to learn from you.

Letting others know about ourselves has to be done very simply and truly. You must not get nervous or seem to be more important than the people you teach, and you must not forget important points. (See Things To Do) Most village women will ask you questions about yourself and your work. They may even ask you how much money you are paid for your work. This question will be asked frequently as you start work in a village. People may be afraid that you will want more than your regular amount of money and that you may ask them for payment for your work for them. Later, as you have worked in the

village, this question may be asked by village mothers who respect you and would want their daughters to become health workers. There is no need to let the mothers know exactly how many rupees and paise you get, but you can say that the government pays you money which compares well with that of a teacher and that you will do all the work that needs to be done without any payment from them. Other members of the health team in the village, such as the syana and dai, may ask you many more questions than the village mothers. Do not think they want to know more than they should; be honest with them so that they really get to know you.

*A GOOD TEACHER KNOWS HERSELF AND
IS WILLING TO LET OTHERS KNOW HER*

When people feel safe with you, they may want you to know more about themselves. A village woman may want to talk about her hopes for her children, about her own family, about her happiness or troubles in married life. Give a woman a chance to talk to you about herself. Listen carefully and attempt to understand what she wants in life and what she sees as difficulties. When you talk to her about nutrition, you should help her know how it can help fix some of her problems and let her come more close to some of her hopes.

*WHEN PEOPLE FEEL SAFE WITH YOU, THEY MAY WANT YOU
TO KNOW MORE ABOUT THEM...LISTEN CAREFULLY*

Mothers may want to talk to you and share with you some of their experiences. Listening carefully will help to build trust between you and the village women. But you have to remember two things. One is that you should not ever attempt to have a woman talk to you more than she wants to. The second is that you should not ever share what one mother has told you with any people not in the health team. Be certain you do not ever start gossip about villagers. Talking with other villagers about the experiences of one village mother can ruin your relationship with her and with the whole village. If her experience is useful to others, you can invite her to talk about it to a health education class. But never force her to do so.

As you learn to listen to the village women, you will find not only that you get to know them, but that you gain in many other ways. The women may give you ideas for better ways of teaching. Through their very real experiences, they will add to your knowledge and your understanding of life and yourself.

Skill In Teaching

12.5 People who know well what to teach, who live a healthy life themselves, who like the villagers and are trusted by them, are usually good health workers and teachers. But some teachers are better than others. The ones who have had much experience in teaching are usually better. We will talk in this chapter about ways of teaching nutrition which other people have found useful. But you should find out yourself what are the best ways of teaching in your villages.

Learning Is Change

12.6 You will teach new ways of growing, selecting, and making food ready for eating. The family has only gained from the teaching when they change their ways of doing things. It is very important to know that learning is only good and useful when it helps to cause a good change in someone's life. Remember that because learning is change, it takes work and time on the part of the family.

All people want change as they want to find the answer to their troubles; all people fear change as it may cause them new troubles. Let us take a useful example. A mother who wants to give extra food to her 4 month old baby takes the chance that her mother-in-law may not like what she wants to do and that even her husband may be upset. In addition, she must have dung to use for fuel to cook the extra baby food and she will have to give her time to do this extra work. She knows that if the child gets worms, most people will say it is because of the extra food. You have told her that this food will keep the child strong and healthy. But till she sees this, she cannot be certain of this good result. You can reduce (make less) the possible troubles and worries of the mother by getting the whole family and even the villagers to take part in the health education. If all of them get a chance to take part in the discussion, if they can ask many questions and talk about their own experiences, they will help the

mothers to learn. Because people learn from others' experiences and from seeing others do things, you should ask the mothers to let others see their skills in making food ready to eat and feeding it to children. These experienced mothers may be able to talk to the others about the good results of feeding the children this way. The mother who has done well in her own home is the best teacher for other mothers.

Do not forget that the more the change, the more difficult the learning. Take things slowly, easily, and gently. Attempt to learn more about the difficulties some mothers have in learning to change. Attempt to learn more about ways you can teach from the mothers who have done well.

*LEARN ABOUT WAYS YOU CAN TEACH FROM
THE MOTHERS WHO HAVE DONE WELL*

Some teachers do not help people learn because they think that teaching people is like filling up an empty bottle and that all we have to do is to "fill people up with knowledge." But it is not like this. "The bottle is full before we begin — people know and believe many things." For example, a mother may know much about the way to feed children by the customs of her own village. What we have to do is more like changing what is inside a full bottle. This is difficult and can only be done if we make small changes at a time, respecting the good or the harmless in the old beliefs. We may have to work hard to teach the mothers that some of the customs are not healthy ones. It is wise not to attempt to change all beliefs; we do a good job by using some good beliefs and adding to them.

Teaching In 6 Steps

12.7 Teaching has to be done in a very well planned and orderly manner.

1. The first step is learning about the people you teach.
2. The second step is becoming friends with the people you teach.
3. The third step is to find what people want.
4. The fourth step is making certain that the people you teach know that what they want is important.

5. The fifth step is making people see that there is a way out of their troubles.
6. The sixth step is to see if your teaching has done what you hoped to do.

First Step: Learning About the People You Teach

12.8 To teach people how to take out the blocks in their children's food-path, we must first know what these blocks are. Before we start, we need to know as much as we can about the families we are teaching. We must learn about the way they live and cook and feed their children. Only when we know this can we teach them the things they can do to make their lives good. Other people in other places will be different.

You need to know about every family that you teach. Ask your doctor or public health nurse to discuss with you the community diagnosis of malnutrition and what the most common blocks on the food-path are. Much can be learned about the families by talking to mothers at clinics. More can be learned by visiting them at home and seeing what foods and cooking pots they have. When we cannot visit every mother, we should attempt to visit the homes of some mothers, mostly the mothers of children who are sick. If our families grow their food, then we must find out as much as we can about how they grow it now and how they might grow and store it in a good way. If our families buy food, then we must know the protein and calorie "best buys."

Most mothers in a class will probably have nearly the same problems. But no two mothers are exactly the same, and every one will probably have her own special problems. It is important to attempt to talk to every mother by herself at some time so that you can find out how *she* does things and what her special troubles are. Attempt to make her feel that you want very much to help her. Do not ever give a mother the feeling that you do not approve of her cooking and feeding of her family. Let her know all the points you find that she does right. Make her feel that she is on the right path. You may find that even the best mothers have some wrong belief about food. A wrong belief is important when it leads to wrong practices.

Some beliefs are not wrong because they do not cause harmful practices. In our field work in Punjab we thought that the grouping

of foods as “hot or cold” was not a harmful belief. The scientific way of grouping foods — energy, body-building, or protective — can be talked about as “another way of looking at foods” without attacking the belief in hot and cold foods.

Other common wrong beliefs proved to be very, very harmful to the nutrition of the children:

- Parchawan or shadow casting is blamed by many as the cause of marasmus. These mothers do not know that lack of food is most important.
- Many think that giving cereals early is the cause of worms and diarrhoea.
- Most think that breast feeding is enough to fill the child’s needs even after 6 months of age.
- Most mothers treat illnesses by not giving the child any solid or semi-solid (soft) foods.

Harmful beliefs should be kept in mind when teaching. In some cases you can add the modern nutrition knowledge without fighting the old beliefs; for example, you can let mothers see that marasmus can be prevented by good nutrition and can even be cured by it. Do not forget that letting people see for themselves that nutrition works is the important thing. Leave it up to the mothers to keep believing or not that parchawan plays a part. Some harmful beliefs have to be attacked directly like the fact that children should be starved when they are ill. You have to help mothers to see that this is a very harmful belief. It is important to have proper balanced nutrition to fight disease. A mother should know this to help her children when they are ill.

Second Step: Becoming Friends With the People You Teach

12.9 People will learn from you more easily if they see you are a friend. If you meet groups, talk to the mothers before you start and let them know who you are and what you want. Be friendly, proper, and respectful to the mothers. Do not get angry. Do not ever say to a mother that she is stupid. Do not make a mother a bad example to her friends so that she does not feel happy with them. Don’t “judge” a mother — help her. But if she has done well, be quick to speak of the good things she has done. Say “good-bye” to your



Figure 12.2

Visit the Homes of the Families you Teach

class when it is finished and say that you hope that you will see your students again.

Third Step: Finding People's Needs

12.10 Attempt to find what a mother needs. Does she want her children to be healthy, to work, and to get a good job when they grow up? When her child is sick, she will want him to get well again. Does she want her child to do well at school? If, for example, she knows that underweight children do not do as well at school as well-nourished ones, she may more easily agree to feed her child differently.

Fourth Step: Making Certain That the People You Teach Know That What They Want Is Important

12.11 A mother must be made to see how serious it is if her child does not grow up as healthy, clever, or able to work hard, as he could. If you let mothers know that a child who is not clever will not be able to make very much money and will not be able to help them, they will probably think that this is serious. Teach the mothers that underweight children are weak and may die more easily than well-fed children.

Fifth Step: Helping People Know That There Is A Way Out Of Their Troubles

12.12 Help mothers to see that there is a way out of their troubles by changing their behavior. If a mother has a child who is not growing up strong and clever, make her see that the way to stop this is to give him more protein foods and to feed him more times a day. Be careful not to suggest things to the mother that she cannot do. This is why it is so important to find out, in the first teaching step, what is possible for her.

Sixth Step: Has Our Teaching Succeeded?

12.13 This is called "evaluating health education." It means finding out if people are doing the things they have been taught. One way is to ask them questions. A much better way is to visit families in their homes to see what they are doing. Perhaps there is a

maize mill in the village, and you have been teaching mothers to grind beans and maize together into meal. Are they doing this? Are your mothers teaching other mothers? If your health education is succeeding and mothers are doing what you tell them, this is good. Your efforts are working, and you will surely be pleased. But, what if they are not? Think carefully about what you are doing. Perhaps you should change the way in which you teach people. But do not be too impatient — people may take quite a long time to change what they do.

Better Ways Of Teaching

"If I Do It, I Know"

12.14 The Chinese have a proverb which is very true for health education. It is this:

What we hear — we forget
What we see — we remember
What we do — we know

Don't be content therefore with only talking. You must show the class exactly what you are trying to teach them. This means, in the class you must cook the meals exactly as you want them to be cooked, using the same utensils and spoons that mothers use at home, so that they can see exactly what you mean. Then in the class have them do it themselves. This means that you must have all the things that you need to let the class see and that you must have enough to let at least some of the mothers do it themselves. *Much of this section is about the things that you need for teaching so that you can let mothers see and they can do things themselves.*

"IF I DO IT, I KNOW"

LET MOTHERS DO IN CLASS WHAT YOU TEACH THEM

Good teachers go on learning how to teach in a good way all their lives. Here is some help for those who are starting or who may have started in the wrong way.

Have your class in a comfortable place where the mothers can sit down, where it is not very hot, and where mothers can come and go easily but not make noise to stop the teaching. It is frequently

good to teach under the shade of a tree and not in a small, hot room.

Because the list of things to teach in Section 12.18 is a long one, you should decide which things you think the mothers in your district need to learn and make them into lessons. Give every lesson a name, such as "good budgeting" (make certain you let them know what budgeting means), "breast feeding" "body-building foods," or "diarrhoea." Go through your lessons one after the other for weeks or months. Then go through them again, changing them as you think best. Say the name of your lesson to the mothers before you start.

It is usually good to teach only one thing at a time. This is most important when teaching the nine good rules that you will find in Section 12.18. Teach only one at a time. These rules are the things that matter most and other things come second. If only every mother could follow these 9 rules, there would be no malnutrition or marasmus.

Help The Mothers Become Involved. Start By Asking Questions Of The Mothers

12.15 If your talk is to be on "good budgeting," ask them "How much do you have to spend on food?" or "For what do you spend it?" Attempt to make your lesson partly a simple talk with the mothers. Do not talk for more than 5 minutes before asking more questions, even though your whole lesson may take half an hour. After you have been talking for some minutes, ask questions, listen to what mothers say, say something that will make them laugh or let them see something, and then talk again. Use easy words, and make certain that the class understands them.

When you do something for the mothers to see, use the same kind of pots and stoves as they do. If you get them to do what you want them to do in class, they will then know how to do it when they get home. If you are working to get mothers to cook new foods, taste them yourself, and let the mothers taste them. Be certain that the foods are not very hot before you give them to a child. Usually, children will do as they see their mothers do and eat the food that has been cooked. Because mothers should cook cleanly, you must make certain that your own cooking is clean. Wash your hands before you touch any food and keep food covered so that flies cannot walk on it. If you want mothers to buy something at a shop, let them see the

thing that they must buy and you visit the local shops to make certain they sell it.

Teach with posters. Put them up one at a time when you want to use them, but do not keep them up all the time. People soon get used to posters and do not look at them. Color them. If they are not in the local language, put pieces of paper on them with writing in the local language. *Make certain you ask mothers what they can see in the posters you teach with.* People who are not used to pictures find them sometimes hard to understand.

Change your teaching with the seasons. If it is the planting season, make the families want to clear more land and plant more protein crops. If you can only teach one thing, be certain that you teach what is most important. When you have no special thing to talk about, teach one of the 9 good rules in Section 12.18.

MAKE MOTHERS INTO TEACHERS

Don't forget the father! Many men want to know how children should be fed and do not understand how much money their wives need to buy food for the family. It is important for them to know about how women should eat when they are pregnant or breast feeding. Attempt to teach the father when you can. Some fathers will come to an "open day" or "husbands' day" at a womens' group—if there is some important man to come and speak to them.

Last of all, do not forget the sixth step: attempt to find out if your teaching is working. If you are working in an Under-Fives Clinic, are the children gaining weight as they should? Visit mothers in their homes. Are they doing what you have been teaching them?

Another way to find out if mothers know what you have been teaching them is to make out a list of questions and to go around the village and see if mothers know the answers. It is a very good thing to ask questions before you have started teaching in a village and then ask them again some months later. Do mothers know more than they did before? Do the mothers who have been to the clinic know more than the other mothers? As we have said before, mothers who know the answers to questions do not do all the time what they have been told. But even so, knowing is frequently the first step to doing.

The Local Food Words

12.16 So far, we have talked about food using the names from science. You have learned about things like protein, amino acids, and calories. It is now time to think about the food words villagers or townspeople use. These are the local words and are important for teaching.

Many, many times there may be no local word which means quite the same as the English word. There will certainly be no local word for such things as protein or vaccine. If you are going to talk about protein, you will have to use the English word and say what it means. Another thing you can do is to take some local words and expand or give it more meaning. Sometimes there will be many local words which mean the same as an English word, but are different from one another. (English "sugar" becomes chini, sakkar, ghur.) Be careful to find and use the right words.

The most important word is the one the local people use for "food." Some languages use the same word for the staple food, such as wheat chappati ("roti"), and for food of any kind. That is, the word will have a double meaning. In English the "bread" is sometimes used in this way. The sentence, "Can I have some butter on my bread?" uses the word bread to mean bread only. The sentence from the Christian prayer, "Give us this day our daily bread" uses the English word bread to mean food of any kind. It is important to know if the local word for food has this double meaning.

<i>LEARN THE LOCAL FOOD LANGUAGE</i>

Two other important words are those for the thick porridge made of boiled or roasted wheat or maize or millet. This is thick enough to be rolled into a ball and eaten with fingers. There is no English word for this food.

There is the English word porridge. This is made of the grain oats boiled in water. It is eaten by men and women as well as children. Porridge is not thick enough to be rolled into a ball with the fingers, so it is eaten with a spoon, usually with milk and sugar. In this book we use the word porridge to mean the thin wheat, maize, or rice food that is given to children with a spoon, as well as the thick variety that can be eaten with the fingers.

What To Teach

Teaching A Family To Take Out The Blocks In Their Food-Path

12.17 In Section 11.30 you read much about the blocks in the food-path that can be taken out by health education. Some of them will be important and some of them less important. Some of them will be easy to take out, while others will certainly be very difficult. *We have to find the things that will be easiest for the mothers to do and which will make the most difference to the nutrition of their children, and teach these.* This may not be an easy decision to make, but we can get some help in the following way.

How have some mothers been able to do the right things? When we weigh children and put their weights on a road-to-health graph, we will probably find that many children are not on the road to health, some will be on it, and some may even be above it. Some of these healthy children will be from poor homes; how have their mothers been able to feed them so well? In some way, they have been able to get around the blocks on the food-path — what is their secret?

There are a number of possibilities. Children are different in many ways. One of the ways in which they are different is the way in which their bodies use food to grow with. Even when given the same food, one child may grow more than another. It may be that the bodies of these healthy children are better at using and growing with the small amount of food that they are given. But this is only a small part of the answer. It is more probable that the mother of the healthy child will have been doing the things that you have read about in this book, such as feeding her child many times a day and giving him protein food. She may have found ways of feeding him that are very good in the place where she lives. She may have found some way of making food that other mothers might find useful to cook and to feed to their children. Can we learn from the mothers who have done so well in feeding their children? Can we teach other mothers to do the same things? What one mother can do to get around the blocks on the food-path, other mothers can probably do also. We must learn from these mothers as we teach those who have not done as well.

VISIT THE HOMES OF THE FAMILIES YOU TEACH



Figure 12.3

Teach Mothers That They Themselves Need Extra Food
When They Are Pregnant

The Nine Good Rules

12.18 If you are in doubt about what to teach, you will not go far wrong if you teach the "Nine Good Rules."

1. Breast feeding is best and must end slowly after the age of 18 months.
2. Bottle feeding is bad.
3. A child must start eating porridge when he is 6 months old and be eating porridge with added protein by the time he is 8 months old.
4. Children need *at least* 3 meals with body-building food every day.
5. Children need some protective foods every day.
6. Children need food before going to school, and those who are at school in the middle of the day need to take food to school with them.
7. Children with diarrhoea need much to drink to replace the lost water and salts. All sick children must be fed though they may not ask for food.
8. Plain maize or wheat porridge is not good enough — some protein must be added. In general, a good food is a mixed food.
9. Pregnant women and breast feeding mothers need extra food of all kinds, protein and protective foods most of all.

If every mother did these things, children would be much more healthy than they are now. Teach families everything about these nine good rules.

Explain to mothers that you are saying things to them that may be new to them and that you know that many other people in the village, usually the old women and grandmothers, will not believe them. Let them know that you are teaching them these things because you know that they are important and will help their children. Let them know that you understand how difficult it is for them to bring new ideas to a village where many people believe something different.

Say to mothers that in many districts 3 children out of every 10 die before the age of 5. Say that the body of a malnourished child is like a house in which the ants have eaten away the poles and which is easily washed out in the rains. If you have forgotten this story, read about it again in Section 2.6.

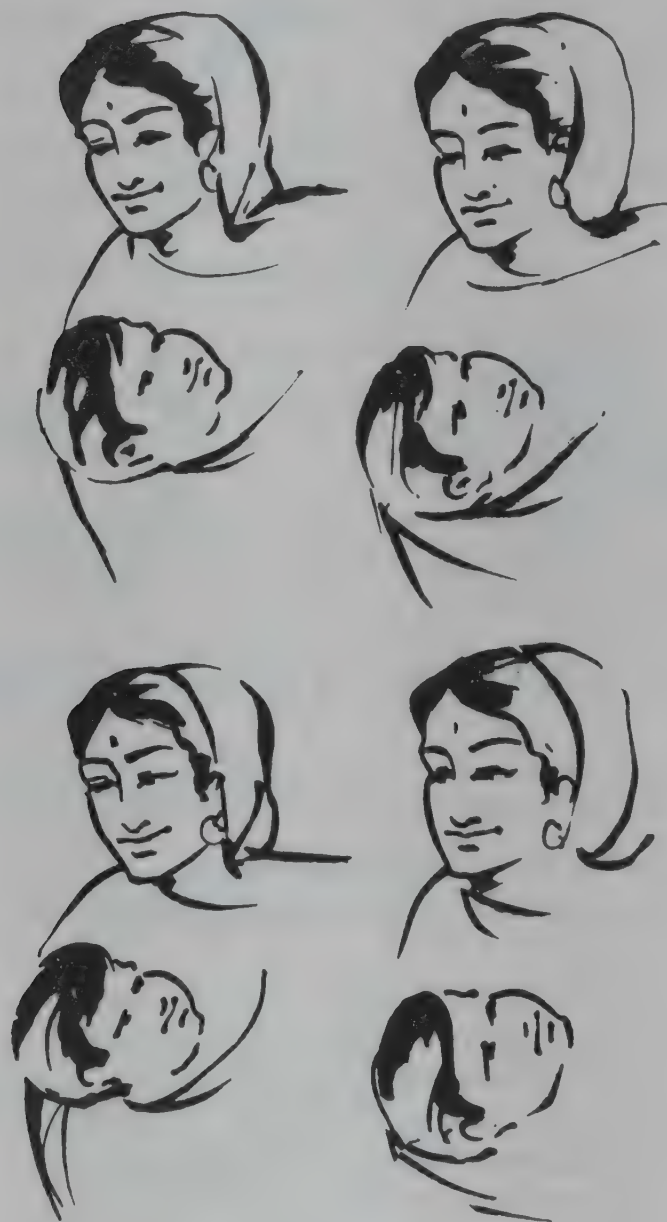


Figure 12.4

**No Mother Must Ever Go From a Clinic
Without Being Taught Something**

*TEACHING IN WELL-BABY CLINICS
IS MORE IMPORTANT THAN RECORD KEEPING*

Ask mothers what they mean by a healthy child. Let them see the things that let us know if a child is healthy and which are listed at the end of Section 1.4. Talk to them about the word in their language for "health," "fat," "well-nourished" and "badly nourished." You may wish to have them see that a child who is fat can still have kwashiorkor because he is being given the wrong food and does not eat enough protein. Teach mothers about marasmus and kwashiorkor. Use the local names if you can, and attempt to get mothers to recognize these diseases. Ask them what they think causes the diseases. Work very hard to make mothers understand that these diseases are the result of not getting enough of the right kinds of food. Teach them that malnutrition can be cured only by giving children the right food — not by giving injections. When malnourished children are given injections, these are for the other diseases that can attack a malnourished child's body, and not for curing the malnutrition. Be certain to teach them about the underweight child and why he is important.

*IN WELL-BABY CLINICS
TEACHING IS MORE IMPORTANT THAN WEIGHING*

Teach that food is for building the body, giving energy and protecting children, and not only for stopping hunger. Some health educators or teachers think that mothers should be taught about body-building food, energy foods, and protective foods. This is not really necessary, but they must be taught what foods they should give to children and how they should cook them. Teach mothers how to make the childrens' meals described in Sections 8.8 to 8.13. Teach them that it is more important to feed children than visitors.

Teach mothers that they themselves need extra food when they are pregnant. They need food for themselves and food for the baby inside them.

*DO NOT TEACH PEOPLE THINGS THAT ARE
NOT POSSIBLE FOR THEM TO DO*

Teach all mothers who have not started bottle feeding how bad and how difficult it is. The only mothers who should be taught about bottle feeding are those who really cannot breast feed and who will not use a cup and bit of cotton. These mothers must be taught most of what is in Chapter 8. Do not ever teach a group of pregnant or breast feeding mothers about how to bottle feed. Only teach them how bad it is.

*NO MOTHER MUST EVER GO OUT OF A CLINIC WITHOUT
BEING TAUGHT SOMETHING*

What Not To Do

12.19 Many of the things in this book are more difficult than village families can understand. Do not attempt to teach about amino acids, NPU, decimals, percentages, reference protein, calories, vitamins, iron, calcium, folic acid, nicotinic acid, or aflatoxin. Only teach them about grams and kilograms, if these weights are being used in the shops they go to. Do **not** teach about food-paths. Do not attempt to make yourself seem important because of your new knowledge. Teach them what they need to know (Section 12.18).

THINGS TO DO

1. *Findings of the students*

Let every student get ready 4 sentences in which he explains what he thinks can be done to help families to "help themselves." Let these sentences start with a statement of their own feelings, such as "I am happy that....," or "I am grateful that...." Let everyone of the students say his sentences out loud in the class.

2. *Role Play*

Let a small group role play a family. Let one person play the visiting auxiliary nurse midwife. See how the family acts as the auxiliary nurse midwife attempts to teach them one of the 9 good rules.

Role play a group of mothers being taught by one or two health workers. Let students take turns playing the health workers as they

attempt to teach one of the 9 good rules. These role plays are very important; they should be done as if the classes were real, with frequent questions from and to the mothers, cooking and feeding demonstrations, and other things done in class.

3. *Rank Order*

Place in order of importance what you think to be the four most important of the 9 good rules to teach mothers. Make a list of what pictures, cooking material, and other things you need to teach these rules.

4. *Make a list of important nutrition beliefs that are wrong in your area*

Have every student get ready a 10 minute talk on "why" one of these ideas is wrong, and how we can help families to learn the truth, and how we can help families to change their behavior. Discuss the ideas and offer the students all the possible questions you can think of that mothers could ask.

5. *Make and use a flannelgraph*

In Section 12.14 there was a Chinese saying which went like this: "What we hear — we forget. What we see — we remember. What we do — we know." Much has been said about how important it is for people to *see the teacher do things*. If this is not possible all the time, the next best thing is for them to *see things*. A good way of doing this is to use a flannelgraph, which is a special kind of picture for teaching. (Flannel is the name for a kind of cloth that is fluffy and hairy to touch.)

The flannelgraph itself is a piece of board, covered with flannel, which you can put up in front of a class and put pictures on. Pictures will stay on this flannel and can be put up and taken down as needed. Make your flannelgraph like this:

Pin a piece of cloth that is good and fluffy to touch to a board, such as a blackboard. Lint (a kind of medical flannel) or a blanket can be used. Put up the board in front of the class so that it slopes back a bit.

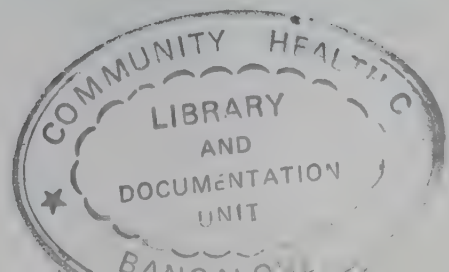




Figure 12.5

**Using a Flannelgraph to Show
That a Pregnant Mother Needs to Eat Plenty of Fish**

Get together as many pictures as you can to show the things you want to teach about. These can be drawings, pictures from newspapers and posters, or photographs. Be certain you have all the important food words in the local language as well as pictures of the foods.

Words or short sentences can be written on pieces of paper or card. Attach your pictures and sentences to thin cardboard and then attach some flannel or sandpaper to the back of the card. When these pictures are fixed this way, they will stick to a flannelgraph and can easily be put up or taken down as needed.

Start with your flannelgraph empty. By asking questions to the mothers, build up the pictures you want them to see. If you are talking about the foods that a mother should add to her child's porridge, ask them what foods they would add. When the answer is given, put a picture of that food on the flannelgraph. Build up the picture you want them to see by questioning the class in this way.

Say good things about a good answer, and attempt to use a bad one in some way. A good way of teaching, and of using a flannelgraph is to ask the mothers something, to let them see something (such as a food if it is not well known or a picture of a food), and then to say something and let them talk about what they have seen. The process is: ask a question, let them see something, talk about it.

<p><i>ASK QUESTIONS — LET THEM SEE — TALK ABOUT IT</i></p>
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When you make a flannelgraph, see that it does these things:

1. It says a story in which you can see things happen.
2. It has strong colors that you can see well.
3. It looks like the things that people are used to seeing.
4. It has pictures that can be seen from a distance.
5. It makes the people who see it talk about it and ask questions.
6. It lets some of the people who are seeing it help the teacher to say the story and so keeps the class interested.

A flannelgraph can be used in many ways. There is a special flannelgraph made which has the road-to-health graph and which can be used to teach mothers about it. A flannelgraph can be used to talk

all about the food-path to a class of students. But, one of the best uses of a flannelgraph is to teach mothers the things that are listed in Section 12.18.

CHAPTER 13

THE COMMUNITY DIAGNOSIS

In this chapter we have put together much of what we have learned to make the community diagnosis.

How Much Malnutrition Is There?

13.1 In Section 1.11 you learned how you could find out *how much malnutrition there is in a community*. One way to find this out is to weigh many children under 5 years of age and see how many of them come below the low line on the road-to-health card. Another way is to find out how many children between the ages of 1 and 5 years have an arm circumference of less than 14 cm. These are only very simple ways of measuring the malnutrition in a community, but they are useful ones.

If we find that a community has many malnourished children, the next thing to find out is *why they are malnourished*. When an ill person comes to see a doctor, the doctor talks to the person, looks at him, and then does different tests. He first attempts to find out how ill the person is, and then why he is ill. This is named "*making a diagnosis*." When we find how much malnutrition there is in a community, and then why there is malnutrition, we can say we are making the *community diagnosis of malnutrition*.

The amount of malnutrition is different from one district to another and it may change from one year to another, or even from one season to another. In the same way, the blocks in the food-path will be different from district to district, from year to year, and season to season. Because of these things, *the community diagnosis of malnutrition will be different at different times and in different places*. For example, it will be different in Punjabi villages of Ludhiana district or Rupar district and in New Delhi or Madras. In all these places, it will probably be different in 1977 from what it was in 1972. In Ludhiana district it is different between September to March and April to August.

What Are the Blocks in the Food-Path?

13.2 It is easy to find out how much malnutrition there is in a community, to make a list of the things which cause it (blocks in the food-path), and to say how bad we think every one of them is. But it is not at all easy to measure exactly how serious the blocks are, and we shall not attempt to do it here. It is possible to make a very useful community diagnosis of malnutrition by finding out how much malnutrition there is and then thinking about important blocks in the food-path for the district in which you live. If you think carefully, you will probably find that you will know many of the things that you need to know. You will know if rain is a problem in your district or if the roads are bad. You can get help in making other parts of the community diagnosis by asking special questions and then looking for the answers.

Getting the Facts You Need to Make a Community Diagnosis

13.3 Many of the facts needed for making the community diagnosis of malnutrition can be found only by visiting families in their homes. Some questions can be answered only by doctors in hospitals or health centres. Other questions can be answered by the agricultural department. You can find out how much malnutrition there is in a community by doing a nutrition survey as it is described in Section 1.12.

Questioning The Family

13.4 Before you do this, you must decide which families to visit. A community is made of many families, and every one will be different. Some may be very poor, and some not so poor. In some all the children may have died, and in others they may all be living. If you go from any house to any other house you may see rich houses or those with children playing near them. Because these houses are easier to see, you may not talk to all kinds of families as you should. The best thing to do is to visit every house. If this is not possible, then you must *give every house an equal chance of being visited*. The best ways of doing this may be difficult, but one good way is to visit every fifth or every tenth house in the village.

To start, visit the chief or the head man of the village and let him know who you are and what you want to do. When he understands why you have come he will probably let you visit the families in his village. The next thing to do is to *observe*, which is another way of saying "look carefully." Observe all that has anything to do with the food-paths. Are the gardens good or bad? What is in the food stores? Are people drinking alcohol or working? What do you see when you go into a house? How much food is there? What cooking pots are used? If any person in the family is eating when you visit the house, who is eating and how is he eating? If you look carefully, you will soon learn much about the food-paths and what is happening in them. Remember when you see something for yourself you know it is true.

After observing, the next thing to do is to *talk* to people and ask questions. Asking questions in this way is named "holding an interview." There are many things that you may want to know and in this section you will read many kinds of questions that can be asked. You cannot ask everybody all the questions at one visit. How many questions you can ask will depend on how much time you have with the people, and you will probably only have time to ask the more important questions. It may be possible to ask some of the other questions at another visit, or to ask different families different questions. Make a list of the questions that you want to ask, write down the answers as the people give them, and make notes on all that you see. When you are asking questions, attempt to have a friendly discussion with them, and not just ask questions one after another. This will be more interesting for the families you visit and they may be more willing to give you true answers.

It is not easy to get full or true answers all the time. If you are not certain an answer is right, ask the questions in a different way at a different time. For example, you may not think that a mother is being truthful when she says she feeds her child 3 times a day. At a different time ask her what times in the day she feeds her child. Then if she does not give 3 different times, the answer to one of these questions must be wrong. A mother may attempt to please you by saying what she thinks you want to hear, and not what she really does. However, she may not be able to give the right answers all the time about the amount of food that she buys and uses.

People may not want to answer some of the questions. It may be difficult, for example, to get the right answers from them about how

much money they have or about the children who have died. You may have to be very careful when you ask these questions. It may be easier to ask a mother how many children she has had and then how many are living. If a woman does not want to answer some questions, do not force her to give an answer because she may say anything just to have you leave. But most women are pleased to talk to anyone who is very interested in them and their children.

Introduce Yourself To The Family

13.5 First of all, let the people in the house know who you are and why you have come. They should know that you are interested in the feeding of children and want to ask them some questions. Make people feel that you have come to learn about all the good and bad things in their lives and that you are not going to be angry or have other bad feelings when they talk to you about their difficulties.

If it is possible, you and the people you are talking to should sit down while you are talking.

Take the name of the head of the house and the address of the house if it has one. Ask who lives in the house, how they are related, and what jobs people do.

Some Questions You Can Ask The People In Every Family

13.6 The following questions help us to learn the kind of things that we need to know about the food-paths in a family. Because it will not be possible to use them exactly as they are, you will have to change them to make them easier to use. For example, you will have to ask about every child in each family separately.

Some general questions about food:

1. Where does the family get its food? How much comes as payment for other things, is bought, grown, picked from wild plants, or fished from rivers?
2. What kinds of food are eaten and how many times a day or week are they eaten?
3. What kind of meals does the family eat? Do people eat together or separately? How many people in the house are

eating from the same pot? How much is cooked for all of them at every meal?

4. Does the food they get change at different times of the month and at different times of the year? What food has the family eaten in the last 24 hours? (most people can only remember back this far but not before that)
5. What visitors or relatives are living in the house? What do they eat? When and how are they given their meals?
6. How much alcohol is drunk? When is it drunk and who drinks it?

Some questions about children:

1. How many children has the mother had? How many are living? What are the ages of the children?
2. How old were the children who died? What diseases caused them to die?
3. Were the children breast fed? How long? Why did breast feeding stop? Did it stop slowly or suddenly?
4. Is any other milk given to the children? Are any children bottle fed? If so, how is the feeding bottle washed and sterilized? What is put into the feeding bottle?
5. Do the children have road-to-health cards? Does the mother understand what they mean? Are the children on the road-to-health or not? (Even though weighing the children or measuring their arm circumference is not part of an interview, this will be a good time to take the weight of the child and measure his arm circumference, discussing the use of the road-to-health card and finding out whether the mother understands it and uses it to measure the growth of her child and will be valuable information if you are interested in the nutrition of the family.)

Questions about family needs:

1. How does the family eat its evening meal?
2. What meals do the children have every day? How many times a day are the children fed? What do they eat?

3. Do the parents and children eat together? If the family does not eat together, how much food is put on the husband's plate, and how much is for the other people in the family?
4. Do the young children have a plate to themselves? Who helps to feed the young children?
5. Do the young children eat porridge? Is the porridge mixed with protein?

(These questions are important, so attempt to find out how much food a young child gets every day, and how he is fed. One way to find out is to ask a mother what she fed her young child yesterday. Even better than this is to see the young children eating, then you will see what happens for yourself.)

6. How far do children have to walk to school? Do they have breakfast before they go? Do they get any food in the middle of the day?

Attempt to find out if mothers know the diseases *kwashiorkor* and *marasmus*. Try to find out what the mothers belief is? Does she know what is the real cause of marasmus? Does she know how she can help a marasmic child? Let them see pictures of children with these diseases, and ask them if they have their own words for them. If they have, ask them what they think causes these diseases. In some districts people think that a child gets kwashiorkor because his father has been with another woman and not because the child has not been eating the right food. Or people may believe that marasmus, "soka," is caused by parchawan (shadow casting) and cannot be cured.

Questions about customs:

1. What do people believe about breast feeding and the time a child should be taken from his mother's breast? Do they make special food for the child? When do they think a child should take food other than milk?
2. Are there any foods that a pregnant mother should or should not eat? Are there any foods that children should not eat?
3. Is a woman free to look after her children in any new way or does she have to ask her husband or mother-in-law before making any changes?

4. What new ways of eating and cooking has a mother learned in the last year? Where has she learned them? Does she want to know more about taking good care of her children? To whom does she go for help and knowledge when she needs it?

Questions about cooking, fuel, and water:

1. How does the family cook?
2. What local recipes are there? A "recipe" is a description of how a food is cooked. It tells you exactly what has been used to make this food so you can decide what will be the nutritional value of the particular food.
3. What cooking pots are used? Is there a pestle and mortar or hand chakki or a sieve in the house?
4. What fuel is used? How does the family get its fuel? If they buy it, how much money do they pay for it?
5. Where does the water come from? Who carries it? Does the family think that the water is clean and safe? Do they have to boil it before drinking it?

Questions for people in towns — the buyers of food:

1. How much money does the husband get for his work? Many husbands do not let their wives know this, and you may have to talk to the husband himself about this. Some people may not like to talk about it; do not force them.
2. How much money does the husband give his wife to buy food?

(Because a woman may find it difficult to answer these questions, it may be good to put them late in your talk after she knows you and is more used to answering questions. Even so, you may not get answers to these questions. You may have to guess from the husband's job how much money he gets or guess from the look of the house if the family is rich or poor.)

3. Who buys the different kinds of food?

(You have asked how many children there are in the family. Now you will be able to work out how much money is used to buy food for every person.)

4. Is there enough money for the whole month, or is it gone in the third or fourth week?
5. Are big or small amounts of food bought at a time? Does the mother understand buying by weight and volume? Does she know what is meant by grams and kilograms, or pounds and ounces, or litres and pints? If these kinds of measures are known to the village women, find out about the local measures used in the shops.
6. If the family is in a town, do relatives bring in any food from the country? Does the wife have a garden? What do they grow in it?

(Remember, many people will not be comfortable or will not want to answer these questions, and you should never force them to give you an answer if they do not want to. Get as many facts and answers as you can in as friendly and helpful a way as possible.)

Questions mostly for villagers — the growers of food:

1. Does the family have fields and a vegetable garden? How big? What foods do they grow? How much was grown last year, for example?
2. Who works in the fields and gardens and at which time of the year? How long do they work? Who clears new land for planting?
3. Have the crops had any diseases?
4. Does the family collect foods that grow by themselves(wild)?
5. Does the family have cows, buffaloes, goats, pigs or chickens? How many eggs do the chickens make? What happens to these eggs? Are the cows and goats milked? Are any of them cooked for food? Who eats them? Is there a river or lake nearby with fishes? Do the family catch fishes and cook them for meals? How often?
6. Have the animals had any diseases?
7. What foods are sold? How much food is sold? How much is kept for family eating?

8. How are foods stored? Do rats or insects eat any of the foods while they are stored? What protects the foods against pests?

Give The Family A Chance To Ask Questions

13.7 After you have asked the questions you wanted to ask, you should give the people you have been talking to a chance to ask questions. Many mothers want very much to know how they can feed their children in a good way. You may be able to teach them from what you have read in this book.

Last of all, when you leave, remember to thank the family and say that you hope to see them again.

THANK THE PEOPLE WHO ANSWER YOUR QUESTIONS

Questions About Agriculture

13.8 Many blocks in the food-path are related to agriculture. Some questions that need to be asked are listed, but these are not the only ones and you will easily be able to think of many more. An agricultural assistant, or agricultural officer, may be able to give you the answers to them.

1. Is enough land being used to grow crops?
2. Are people growing the right crops?
3. Are people growing the best variety of crops?
4. Are fertilizers being used in the right way?
5. Are insecticides being used in the right way?
6. Are the fields and gardens being dug and planted as they should be?

Questions For The Medical Department

13.9 A doctor or a nurse may be able to give you the answers to some or all of these questions. You may have found the answers to some of them in Sections 2.7, 2.8 and 2.9.

1. About how many children died of malnutrition last year? Did these children die only of malnutrition, or did they die of some disease and malnutrition?
2. How common is kwashiorkor in the area? How many cases were seen in the hospital or health centre last year? How many cases died? How many children got well again?
3. How common is marasmus in the area? How many cases were seen in the hospital or health centre last year? How many cases died? How many children got well again?
4. How common is marasmic kwashiorkor? How many cases were seen in the hospital or health centre last year? How many cases died? How many children got well again?

(Remember that some children may die before they get to the hospital and that many underweight children do not go to Under-Fives Clinics. You may be able to find out more than the hospital knows by visiting people at home and weighing children.)

5. How many underweight children are there? By this we mean how many children are there under the low line on the road-to-health card?
6. How many 1 to 5 year old children are there with an arm circumference of less than 14 cm? If you have not done so by this time, can you find this out? (See Sections 1.10 and 1.12)
7. Are there any cases of anemia among the children and mothers?
8. Do you hear complaints of night blindness?
9. What diseases are there in the district which make malnutrition bad or which are made bad by malnutrition? (See Section 2.3)

Making The Community Diagnosis Of Malnutrition

13.10 We have seen that it is not very difficult to measure how much malnutrition there is in a community, but that it may be very difficult to measure how serious every one of the blocks in the food-path is. You can measure some things, such as the number or

percent of underweight children in a village. If you have visited many families (more than 20), you can count how many of them do such things as use feeding bottles, or run out of groundnuts before next year's harvest, or eat maize without any vegetables. You should attempt to measure things when you can. But there will be many things that you cannot measure, such as how difficult transport is or how bad the roads are. All you will be able to say is how important they seem to be, and if one is more important than another. Put a "+" mark in pencil opposite the blocks which you think are important in the place where you work. If necessary, put in more than one "+," like this:

Block of no importance	0
Block may or may not be important, don't know	<u>±</u>
Block is there but not of much importance	+
Block quite important	++
Block very important	+++
Block so important that it is the only one which really matters	++++

Table 13.1
The Community Diagnosis of Malnutrition

Place: _____ Date: _____

There is this much malnutrition in the community:

_____ children died of malnutrition in the hospital last year.

Kwashiorkor is *not seen / not common / quite common / very common*. There were _____ cases of kwashiorkor in the hospital or health centre last year.

Marasmus is *not seen / not common / quite common / very common*. There were _____ cases of marasmus in the hospital or health centre last year.

Marasmic kwashior is *not seen / not common / quite common / very common*. There were _____ cases of marasmic kwashiorkor in the hospital or health centre last year.

_____ % of children in the district are not on the road-to-health.

_____ % of one to five-year-old children have an arm circumference of less than 14 cm.

You may not be able to get figures of the different kinds of malnutrition, and it may be necessary to put them all together as "mal-nourished children."

These blocks in the food-path cause malnutrition:

<i>Blocks in the Food-Path</i>	<i>The importance of the block</i>	<i>Taking out the block possible by health education</i>
People so sick they cannot work hard	_____	_____
Many people and not enough land	_____	_____
Men not working enough in the fields	_____	_____
Not enough land cleared for planting	_____	_____
Soil erosion	_____	_____
The wrong crops grown	_____	_____
The wrong varieties of crops grown	_____	_____
Fields dug and planted in the wrong way	_____	_____
Fertilizer not used	_____	_____
Insecticide not used	_____	_____
Not enough men in the villages to work	_____	_____
Drought	_____	_____
Plant and animal diseases	_____	_____
Other kinds of farming which could be done in a good way	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Insects spoiling the food stores		
Rats and mice spoiling the food stores		
Not enough roads		
Not enough transport		
Not enough markets		
Very large profits by wholesalers and retailers		
Bad budgeting		
Wasteful shopping		
Bottle feeding		
Advertising the wrong food and drink		
Not enough fuel		
Broken families		
Families so large that one worker does not get enough money to feed it		
Not enough jobs		
Shares of food that are not enough		
Mothers not knowing the best ways of feeding their young children		
Customs blocking the food-path:		
Alcohol blocks the food-path in this way:		
These diseases are seen that make malnutrition worse:		

Table 13.1 continued

It may help you to complete the community diagnosis of malnutrition in your district if you make a list of what you think are the most important blocks in the food-path.

The ten most important blocks in the food-path:

In the _____ district they are:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

In this chapter we have been studying why there is malnutrition in a community. What we have really been studying is what is named the *ecology* of malnutrition. The ecology of something is the study of how it fits into, and is related to, what goes on in a community.

THINGS TO DO

1. Visit a community.

In Section 13.3 we say that we could learn much about the nutrition of the people we want to help by visiting them in their homes. The home is so much the best place to learn many of the things we need to know that *everyone learning about nutrition must visit families in their homes*. Teachers sometimes think that this is difficult to organize, or that families will not be happy to see their students. This is not so. Organizing such visits is usually quite easy. Most families are happy to talk to visitors — if the visitors follow the rules in Section 13.4, and if the head man in the village is asked for his approval first, and if the villagers have been informed before. Do not come as strangers and start asking questions.

Visits can be organized in different ways. Sometimes students can walk from their school to the homes they want to visit. They can go in a bus, or bicycles, or borrow a hospital ambulance or truck. The whole class can go at once, divide themselves into groups of two or three, and go out in the village or township. They can find families, let the families know who they are and what they want to do, and attempt to start a friendly discussion or interview. Two or three families can usually be visited in an afternoon, depending on how many questions are asked. Questions can be asked about everything to do with nutrition. Or different groups of students can ask about different parts of nutrition, such as about children, customs, cooking, fuel and water, or buying food and growing it.

A student can visit families on his own time. Or several students may decide to visit all the families in one part of a village or town, every student taking only a small number of the families. They can then write a report together. The children can be found in a hospital or Under-Fives Clinic, and their homes visited. The homes of well- and badly-nourished children can be compared. If there are enough weighing scales, the children who are visited can be weighed. The arm circumference of all 1 to 5 year old children should be measured all the time.

Home visiting does not end with the visit. If a class of students has been visiting families in a village, they should get together with their teacher and talk about what they have found before they have

forgotten it. One idea should be discussed at a time, and every student should talk about what he has found in his families. For example, if income is being discussed, various income groups can be written on the board and a tally made of family income in the same way that a tally was made of arm circumference in Figure 1.19. Income can be put into groups by amount of money or how many times a month the worker is paid. Students should be asked to write down what the class as a whole has found. They can be asked to write short papers about their visits.

Lady Health Visitors who have to do a dissertation might find nutrition home visiting of this kind very useful. If a number of them do the same thing in different places, they will be able to compare what they find and learn even more.

If possible, families should be visited more than once. Then you will be able to see if families are doing any of the things that they were told about on the first visit. Learning about nutrition is not something that can be finished after one visit. It must go on all through the life of anyone who has anything to do with nutrition.

2. *Make a community diagnosis.*

Make a community diagnosis of malnutrition as it is described in Section 13.10.

3. *Make a farming diary.*

A diary is a book saying what has been done every day or week. Make a diary of the work that is done to grow food every month of the year. You can write about the jobs which are men's work, women's work, and children's work. You can write down the jobs which can be done before the planting season starts, and which jobs have to be done at exactly the right time, such as in the harvest.

4. *Make an exercise for a government class.*

A good experience for a class in government is to describe the blocks in the food-path, and then to discuss whose job it is to take them out. They should think about which government departments should be interested in the problem, which person in the department should have the job of taking a special block, and how he might do it.

After thinking about what the government might do, the class should discuss what other people and organizations in the community could do.

5. *Make a nutrition play.*

Write and act a nutrition play about some of the blocks in the food-path and how they can be taken out. Many classes like these plays very much. One of the best liked parts is that of the baby! Here is a play that one class acted:

A mother has twins (two children born at the same time) only 10 months after her last son was born.

She attempted to feed the 3 children some breast milk and large quantities of tea, milk and sugar in a bottle. She knew that was bad so she bought a cheap buffalo with the money the family had saved. The buffalo had a small calf. When the calf died because the buffalo had very little milk, the buffalo would not eat food because she was very sad. The mother gave all her attention to the buffalo, but the animal died in 2 weeks. The ANM kept on visiting the family but the mother did not listen as well as she should because she was very busy with the buffalo.

One of the twins became very thin and the 3 children looked very weak. The doctor visited the family the day after the buffalo had died and asked the mother to send the twins to a rehabilitation centre. He talked to her about family planning and asked her to attempt to have a long birth interval between children. Though the mother was very sad, she did send the twins to the rehabilitation centre. But she did not want to listen to the family planning idea. The twins became healthy quickly and when the mother saw this and took them home, she knew the doctor's ideas were good. She then asked for family planning. The ANM gave her pills to space her children and the health centre kept on giving her skim milk for the children's porridge. So the play ends happily.

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